

Medical College of Wisconsin

All Student Bulletin

2023 - 2024

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Bulletin

The All Student Bulletin is intended to provide prospective and current learners and the Medical College of Wisconsin (MCW) education community with an overview of MCW's schools and programs, course offerings, as well as policies and processes. While every effort has been made to verify the accuracy of information in this publication, MCW reserves the right to make changes to policies and procedures without notice as necessitated by governing authorities or administrative needs. This bulletin is reviewed annually.

History of the Medical College of Wisconsin

MCW is a private, independent school of the health sciences comprised of the School of Graduate Studies, the School of Medicine and the School of Pharmacy. Founded in 1893 as the Wisconsin College of Physicians and Surgeons, it merged in 1913 with the Milwaukee Medical College to become the Marquette University School of Medicine. In 1967 it separated from Marquette University, and in 1970 changed its name to the Medical College of Wisconsin. The MCW campus is a member of the Milwaukee Regional Medical Center (MRMC), which is a nonprofit consortium of health care institutions whose faculty and staff provide a full range of health and wellness services to the residents of Wisconsin. Other member campuses of the MRMC include Children's Wisconsin, Curative Care Network, Froedtert Hospital, Milwaukee County DHHS Behavioral Health Services, and Versiti Blood Center of Wisconsin's Blood Research Institute.

Mission Statement

We are a distinguished leader and innovator in the education and development of the next generation of physicians, scientists, pharmacists and health professionals; we discover and translate new knowledge in the biomedical and health sciences; we provide cutting-edge, collaborative patient care of the highest quality; and we improve the health of the communities we serve.



Accreditation

- The Medical College of Wisconsin is accredited by the Higher Learning Commission (HLC).
- The Doctor of Medicine program is accredited by the Liaison Committee on Medical Education (LCME).
- The Doctor of Pharmacy Program is accredited by the Accreditation Council for Pharmacy Education (ACPE).
- The Master of Science in Genetic Counseling program is accredited by the Accreditation Council for Genetic Counseling (ACGC).
- The Master of Science in Anesthesia (MSA) program is accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP).
- The Public Health Programs are accredited by the Council on Education for Public Health (CEPH).

Family Educational Rights and Privacy Act

The [Family Educational Rights and Privacy Act](#) (FERPA), as amended, is a federal law administered by the U.S. Department of Education that protects education records, allows for inspection of records, and allows for amendment of records.

Non-Discrimination Statement

The Medical College of Wisconsin (MCW) is committed to fostering a diverse community of outstanding faculty, staff, and students, as well as ensuring equal educational opportunity, employment, and access to services, programs, and activities, without regard to an individual's sex, age, religion, disability, marital status, national origin, sexual orientation, and any other basis prohibited by law or regulation. Employees, students, applicants or other members of the MCW community (including but not limited to vendors, visitors, and guests) may not be subjected to harassment that is prohibited by law or treated adversely or retaliated against based upon a protected characteristic.

MCW's policy, as well as federal and state laws and regulations, prohibit unlawful discrimination and harassment. These laws include the Americans with Disabilities Act (ADA), Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, and Title VII of the Civil Rights Act of 1964 as Amended by the Equal Employment Opportunity Act of 1972. These laws prohibit discrimination and harassment, including sexual harassment and sexual violence.

Employee inquiries concerning the application of Section 503 of the Rehabilitation Act of 1973, Section 402 of the Vietnam Era Veterans' Readjustment Assistance Act of 1974 and Title I of the Americans with Disabilities Act of 1990 may be referred to Adrienne Mitchell, Vice President and Chief People Officer, abmitchell@mcw.edu, (414) 955-4145.

Student inquiries concerning Section 504 of the Rehabilitation Act of 1973 and Title III of the Americans with Disabilities Act of 1990 may be referred to Jennifer Kusch, PhD, Assistant Provost for Student Affairs, jkusch@mcw.edu, (414) 955-4860.

If you think that you have been subjected to sexual harassment, discrimination, or sexual misconduct, please contact Katie Kassulke, Title IX Coordinator, TitleIXCoordinator@mcw.edu, (414) 955-8668 or the Office for Civil Rights, U.S. Department of Education, 500 W. Madison Street, Suite 1475, Chicago, IL 60661-4544, (312) 730-1560, OCR.Chicago@ed.gov.

Academic Calendars

The [academic calendars](#) are published by the Office of the Registrar in consultation with the Academic Calendar Committee. The School of Graduate Studies offers three terms each academic year: fall, spring and summer, while the Schools of Medicine and Pharmacy offer two terms each academic year: fall and spring.

Academic Programs

School of Graduate Studies

Certificate Programs

Clinical Bioethics
Clinical and Translational Science
Community Health Assessment and Planning
Neuroethics
Population Health Management
Precision Medicine
Public Health
Regulatory Science for Facilitating Ethical Research

Master's Programs

Bioethics (MA)
Bioinformatics (MS, in partnership with Marquette University)
Biomedical Engineering (MS, in partnership with Marquette University)
Biostatistics and Data Sciences (MA)
Clinical and Translational Science (MS)
Genetic Counseling (MS)
Global Health Equity (MS)
Healthcare Technologies Management (MS, in partnership with Marquette University)
Medical Physiology (MMP)
Precision Medicine (MS)
Public Health (MPH)

Doctoral Programs

Biochemistry (PhD)
Biomedical Engineering (PhD, in partnership with Marquette University)
Biophysics (PhD)
Biostatistics (PhD)
Cell and Developmental Biology (PhD)
Functional Imaging (PhD, in partnership with Marquette University)
Interdisciplinary Biomedical Sciences
Microbiology and Immunology (PhD)
Neuroscience (PhD)
Pharmacology and Toxicology (PhD)
Physiology (PhD)
Public Health (DrPH)
Public and Community Health (PhD)

School of Medicine

Doctor of Medicine (MD)

Master of Science in Anesthesia (MSA)

School of Pharmacy

Doctor of Pharmacy (PharmD)

The Medical College of Wisconsin also offers dual degrees in the Medical Scientist Training Program (MD/PhD), the Clinical and Translational Science Program (MD/MS) and the Public Health Program (MD/MPH).

Course Catalog

The MCW [course catalog](#) is published by the Office of the Registrar and includes courses offered by the School of Graduate Studies, the School of Medicine and the School of Pharmacy.

Schedule of Classes

The [schedule of classes](#) is published by each school in March/April for fall term and in September/October for spring and summer terms.

Student Services

ADA Accommodations

Students requiring accommodations for learning disabilities and/or personal health reasons are encouraged to contact the appropriate dean or designee in the respective school or program:

School of Graduate Studies

Angela Backus, Director, Enrollment and Student Services

(414) 955-5670

abackus@mcw.edu

School of Medicine

Raj Narayan, MD, Associate Dean for Student Affairs

(414) 955-3636

rnarayan@mcw.edu

School of Pharmacy

Sonia Escamilla, Academic Affairs Coordinator II

(414) 955-7476

sescamilla@mcw.edu

Service Animal Policy

MCW welcomes the use of Service Animals by any student with a disability to ensure full access to all educational offerings at MCW. We recognize the importance of Service Animals in supporting the engagement of individuals with disabilities through the course of daily activities including education and training.

Definitions

- “Service Animal” means “any dog that is individually trained to do work or perform tasks for the benefit of an individual with a disability, including a physical, sensory, psychiatric, intellectual or other mental disability” (28 CFR § 36.104). The crime deterrent effects of an animal’s presence and the provision of emotional support, well-being, comfort, or companionship do not constitute work or tasks for the purposes of this definition.
- “Emotional support” or “therapy” animals provide general comfort to individuals with and without disabilities.
- “Premises” means any campus, building, or facility that is owned, operated, leased, or licensed by MCW.

Bringing a Service Animal on Premises

Prior to bringing a Service Animal to the Premises, MCW requests that students provide notice to the Associate Dean of Student Affairs within their appropriate MCW School or to their regional campus Dean. This notice will allow MCW to inform the student of any areas on the Premises where the Service Animal is not permitted, as allowed under applicable law. Student Affairs for each School will coordinate, as appropriate, with MCW Public Safety to facilitate access as needed for the student’s participation in educational activities at MCW.

Where it is not readily apparent that an animal brought to the Premises is trained to do work or perform tasks for an individual with a disability, MCW may ask whether the animal is required because of a disability and what work or task the animal has been trained to perform.

Expectations of Service Animal on Premises

Service Animals are permitted in all areas of the Premises where the applicable students is allowed to go for the purpose of participation in educational activities associated with MCW, with the exception of areas where the Service Animal’s presence may endanger a sterile environment (healthcare setting, lab setting, etc.).

MCW is not responsible for the care or supervision of a Service Animal. Rather, the student is responsible for all aspects of care and supervision of the Service Animal, including providing food and water and giving the Service Animal opportunities to relieve itself off the Premises.

At all times, a Service Animal on the Premises shall be under the control of the student or the student’s Service Animal handler. The Service Animal must have a tether (harness, leash, or other control device) unless the student is unable, due to disability, to use such a device or the device would interfere with the Service Animal’s safe, effective performance of work or tasks. In such cases, the Service Animal must be under the control of the student or the student’s Service Animal handler by other effective means, such as voice command.

Dismissal of Service Animal

MCW may request a Service Animal be removed from any Premises if the Service Animal is out of the student's control and the student does not take action to control it, or if the Service Animal is not house broken. If dismissal of a Service Animal is necessary, the student will be informed in writing by Dean of Student Affairs in their respective school and accommodations will be made to ensure the student has full use of the premises, even in the absence of a Service Animal.

Bookstores

MCW's official bookstore is [Matthews](#). Such items as school supplies, white coats, books, MCW clothing and swag may be purchased at this bookstore.

Consumer Information

MCW is committed to ensuring prospective and enrolled students and their families have access to information about MCW, its academic programs and its operations. Disclosure of [consumer information](#) has been developed under the guidelines of the Higher Education Act of 1965, as amended in 2009, and includes academic information, financial aid, health and safety, student outcomes and general institutional information.

Diversity and Inclusion

MCW recognizes that the achievement of its mission to be a leader and innovator in the education and development of the next generation of the health sciences workforce consisting of physicians, scientists, pharmacists, and health professionals requires us to cultivate a more demographically diverse student body within our degree-granting educational programs.

The [Office of Diversity and Inclusion](#), the [Student Diversity policy](#), and the [Office of Student Inclusion and Diversity](#) are excellent resources for administrators, faculty, staff, and students.

Exercise Facilities

MCW is proud to offer a variety of exercise facilities to students.

- Central Wisconsin: On campus exercise facility
- Green Bay: St. Norbert College [Mulva Family Fitness & Sports Center](#)
- Milwaukee: [Tonkens Gym](#)

Health Services

MCW wishes to ensure that all students have access to excellent, high-quality health care and that they understand the health services available to them.

- [Student Health and Wellness Services](#)
- [Student Behavioral Health Services](#)

The health services described below are available to all students who are enrolled full-time as degree candidates. Students who are on a Temporary Withdrawal from any academic program may contact student_health@mcw.edu for assistance in navigating services they may need.

Medical Services

Central Wisconsin

MCW-Central Wisconsin does not provide direct medical care. Rather, students are encouraged to establish a local primary care physician to coordinate medical care.

Students have access to Occupational Health Services through MCW's contract with Aspirus Occupational Health, 425 Wind Ridge Drive, Wausau, (715) 847-2812.

TB tests, immunizations, titers, respirator fit testing, etc. are available to MCW-Central Wisconsin students through this contract. Students should identify themselves as an MCW-Central Wisconsin student when making an appointment and bring their MCW ID with them. Students completing required clinical experiences within other health systems have access to Occupational Health Services at those locations:

- Froedtert & MCW Occupational Health: (414) 805-6699
- Mayo Clinic Occupational Medicine: (715) 838-5279; choose option 2 for scheduling
- Marshfield Clinic – Wausau: (715) 389-4799
 - Prevea Occupational Health - Eau Claire: (715) 717-4944 Please contact Kelly Mulder at kmulder@mcw.edu with any questions.

Students may schedule remote primary care, obstetrics and gynecology, and nutrition services by calling Froedtert at (414) 805-6644. It is recommended that students see their primary care provider prior to scheduling appointments with specialty services. Appointments for specialty care services can be made by calling (414) 777-7700.

Green Bay

Students at MCW-Green Bay have access to the Student Health and Medical Services at St. Norbert College (SNC), Mulva Family Fitness & Sports Center, 601 Third Street, 2nd Floor, DePere, (920) 403-3266 or health@snc.edu. Clinical and preventative services offered are provided by registered nurses, nurse practitioners and physician assistants. These services include:

- Assessment, treatment and/or referral for medical needs
- Basic prescription and over-the-counter medications
- Laboratory and diagnostics
- Disease management and post-surgical care
- Physicals, health education and prevention strategies
- Immunizations, including routine and travel immunizations

The cost of a medical provider visit, advanced lab testing, and prescription medications are billed to the student's insurance. Individual deductibles and co-pays may apply. Students should maintain a copy of their current insurance card and bring it with them when they visit SNC Student Health and Medical Services. Appointments are necessary to shorten wait times and to assure the most appropriate practitioner to meet students' needs.

Students are able to *remotely* access MCW physicians through Sargeant Internal Medicine Clinic in Milwaukee. Appointments for primary care services can be made by calling (414) 805-6644. It is recommended that students see their primary care provider prior to scheduling appointments with specialty services. Appointments for specialty care services can be made by calling (414) 777-7700.

Milwaukee

Students at MCW-Milwaukee are able to directly access MCW primary care and specialty physicians. Students may choose to access a provider through the Sargeant Internal Medicine Clinic which is adjacent to the MCW-Milwaukee campus. Appointments for primary care services can be made by calling (414) 805-6644. It is recommended that students see their primary care provider prior to scheduling appointments with specialty services. Appointments for specialty care services can be made by calling (414) 777-7700.

Students may access Froedtert Occupational Health for respirator fit testing, immunizations, titers, drug testing (if required by clinical site or program), post-exposure evaluations and follow-ups. Occupational Health accepts walk-ins, however, prefer that students call the clinic at (414) 805-6699 to schedule an appointment.

Mental Health Services

MCW recognizes that some students may experience stress during their academic work and in their personal lives. All students wishing to access mental health services, other than those who specifically need medication management, should contact ComPsych GuidanceResources either [online](#) or by phone (833) 927-1860. ComPsych has skilled representatives to help students choose the best provider and care for their needs. Students who require medication management should refer to the resources available for their campus described later in this section.

Each campus offers mental health services. Students or immediate family members may utilize up to ten (10) sessions per academic year through MCW's Department of Psychiatry and Behavioral Medicine which are subsidized by MCW. In addition, students may access up to ten (10) sessions, per issue, per year, through ComPsych. After utilizing these subsidized mental health visits, student's health insurance will apply.

Note that students are welcome to use both ComPsych and Department of Psychiatry and Behavioral Medicine resources if they would like.

Available mental health practitioners can provide support for issues related to anxiety, depression, attention deficit disorder, substance abuse, eating disorders, stress management, career problems, major mental illnesses, marital concerns, sexual dysfunction, and grief management, as well as child, adolescent and family concerns.

Other available resources of interest include:

SilverCloud: Free, self-guided, interactive mental health resource available to all MCW students, offering online programs for anxiety, depression and stress. Students can complete modules to help with a variety of topics, including sleep, relaxation, grief and loss, self-esteem and more.

Wellbeing Resource Navigation: The Office of Student Health and Wellness offers resource navigation services to assist students who seek health resources on or off campus. The Student Behavioral Health and Resource Navigator will take time to understand their unique circumstances and will help them understand options at MCW and beyond.

Sessions with Counselor Intern: Short term, supportive counseling for common concerns including anxiety, depression, interpersonal problems, grief/loss. These sessions are available on campus or virtual and are confidential and provided by a counseling intern from Marquette University.

Students who need assistance navigating mental health services may contact Kerri Corcoran, Student Behavioral Health and Resource Navigator, at kcorcoran@mcw.edu or (414) 955-4219.

For an overview of mental health services provided to MCW student please visit the

Student Health and Wellness website:

<https://www.mcw.edu/education/academic-and-student-services/student-wellness>

Central Wisconsin

MCW-Central Wisconsin's contracted provider offers students full access to services which include preventive care and mental health coaching as well as counseling therapy, psychiatric or psychological evaluations and medication management. Both counseling services listed below offer tele-counseling options as well.

- Peaceful Solutions 741 North 1st Street Wausau
(715) 675-3458
- Elmergreen Associates 114 Grand Avenue Wausau
(715) 845-7175

For medication management needs, please contact:

Christopher Knight, Program Manager for Central Wisconsin Campus (715) 870-0917 /
cknight@mcw.edu

OR

Carolyn Bischel, MS, LPC, MCW Behavioral Health Referral Coordinator (414) 955-8950 / (414)
955-8933 / cbischel@mcw.edu

Green Bay

MCW-Green Bay has contracted with the following providers.

- St. Norbert College Counseling and Psychological Services Mulva Family Fitness & Sports Center
601 Third Street, 2nd Floor DePere
(920) 403-3045
- Mental Health Services Crisis Center (24-hour service) 300 Crooks Street
Green Bay (920) 436-8888
- Bellin Health Psychiatric Services (920) 433-6073, #1
Bellin Health Psychiatric Center (920) 433-3630

Milwaukee

The Department of Psychiatry and Behavioral Medicine provides preventive care as well as counseling therapy, psychiatric or psychological evaluations, and medication management. Students who require assistance with medication management should contact the Department of Psychiatry and Behavioral Medicine directly.

The referral program provides easy access to information regarding benefits, choice of clinician, and available treatments through one direct, confidential phone number: (414) 955-8933.

Needs arising outside of normal daytime hours can be addressed through the emergency contact phone number, available 24/7, at (414) 805-6700.

David Cipriano, PhD, program director may be reached at dcipriano@mcw.edu, (414) 955-8950.

Student Health Record and CastleBranch

For all School of Medicine, School of Pharmacy, and Master of Science in Genetic Counseling students, all required immunization records, background checks, necessary testing (titers, PPD, etc.), CPR certification, and related health requirements for matriculation will be stored in CastleBranch for ongoing monitoring throughout the duration of enrollment. Access to CastleBranch will be available to students beyond their education at MCW. It is the responsibility of all students to submit all required health and background information in CastleBranch by the specified due dates. Failure to submit items by the due dates is considered unprofessional behavior and may also result in students being prohibited from participating in clinical rotations and other related activities.

Insurance

It is the policy of the Medical College of Wisconsin that all students must have health insurance coverage throughout each academic year in which they are enrolled at MCW, with no gaps in coverage. MCW has contracted with insurance companies which provide coverage for all full-time students. There are three components of this policy: 1) major medical coverage, 2) disability insurance; and 3) term life insurance. Dental insurance and materials-only vision insurance are also available but are optional and not covered under this Bulletin policy. Medical, Master of Science in Anesthesia, and Pharmacy students are required to have Life, Accidental Death & Dismemberment (AD&D) and Long-Term Disability (LTD) insurance through MCW. Students can waive the institution's major medical insurance if they have a valid health insurance policy. Students who have existing health insurance in place must still complete the health insurance open enrollment form annually, indicate they are declining the health insurance, and must maintain insurance throughout enrollment at the institution.

Students who decline MCW's medical coverage will be required to provide proof of coverage (i.e., copy of the front and back of their insurance card). It is the responsibility of students to ensure that their non-MCW plans will cover their care in Wisconsin. Students are also responsible for exploring their options and assuring there is no coverage gap should the coverage used to decline the MCW health plan lapse.

Students who are not otherwise covered are required to enroll in the plan offered by MCW during the annual open enrollment period. To enroll, students would need to elect a plan during the annual open enrollment period. After the open enrollment period closes, students are unable to make any changes to their MCW health plan unless they experience a qualifying life event.

Open enrollment dates are as follows:

School of Medicine - MKE

New/Incoming Students: JUN 15 - JUN 30

Continuing Students: MAY 15 – JUN 1

School of Medicine - CW

All Students: MAY 15 - JUN 1

School of Medicine - GB

All Students: MAY 15 - JUN 1

School of Pharmacy

New/Incoming Students: JUN 1 - JUN 15 Continuing students: MAY 15 - JUN 1

Master of Science in Anesthesia New/Incoming Students: JUN 15 - JUN 30 Continuing Students: MAY 15 - JUN 1

Insurance premiums are prorated for students who add or drop MCW insurance during the plan year due to qualifying life events. All MCW student insurance plans provide coverage July 1 – June 30 of each plan year for Medical, Master of Science in Anesthesia, and Pharmacy students, unless they withdraw or graduate sooner.

It is the responsibility of all students to submit all required health insurance forms by the specified due dates. Failure to submit items by the due dates is considered unprofessional behavior and may result in being deregistered for courses by the Registrar and being prohibited from participating in clinical rotations and other related activities.

Graduate students should consult their school representative for coverage dates. In the School of Graduate Studies, the annual premium for single coverage will be paid by MCW for all full-time PhD seeking students in the basic sciences.

MCW does not offer workman's compensation for non-employees. If a student incurs out-of-pocket costs for an injury experienced on-campus during the course of their education, and such costs are not covered by insurance, the student should notify student_health@mcw.edu.

MCWconnect

MCWconnect is the student portal which provides access to financial aid and tuition accounts, health insurance enrollment, final grades, registration and transcripts. All new matriculants to MCW receive log in credentials. For assistance email MCWconnect_support@mcw.edu.

Safety Services

MCW produces an [Annual Campus Safety Report](#) in compliance with the Jeanne Clery Act.

Campus specific security/public safety contact information:

- Central Wisconsin: Aspirus Security (715) 847-2926
- Green Bay: [St. Norbert College Campus Safety](#) (920) 403-3299
- Milwaukee: [MCW Public Safety](#) (414) 955-8295 or (414) 955-8299 (emergency)

Central Wisconsin and Green Bay: In the event of an emergency, dial 911 and then immediately contact the security/public safety department listed above.

Milwaukee: In the event of an emergency, call MCW Public Safety at (414) 955-8299. MCW Public Safety will coordinate with any emergency responders.

Please refer to the MCW Public Safety [website](#) for additional information and resources.

All students are required to have personal and emergency contact information on record in MCWconnect. This assists MCW Public Safety in emergency situations. Please note that failure to provide and/or update personal or emergency contact information may result in a registration delay.

Student Government

The Medical College of Wisconsin values student engagement in the governance process. As such, each school has a governance structure in which students are invited to participate.

- Graduate School Student Association
- Medical Student Assembly
- Master of Science in Anesthesia Student Government
- Pharmacy Student Alliance

In addition to these school level governance groups, the Student Leadership Collective (SLC) exists as a unified student governance group which serves as the voice of the entire MCW student body and contributes to institutional programming and decision making as appropriate.

Technology Requirements and Services

The Medical College of Wisconsin seeks to offer the best technology experience during a student's education at MCW by providing the tools and services needed to excel. While at MCW, a laptop and a mobile device are required of students and will be used for taking tests and accessing learning applications. Laptops and mobile devices must meet or exceed the minimum annual technical requirements. Contact the MCW-IS Service Desk at help@mcw.edu or 414-955-4357, option 8.

Software

Students have free access to Microsoft Office 365 as long as they have an active MCW email address. Students are granted access to their MCW emails for 90 days after their graduation date. Office 365 includes locally installed and browser-based versions of Microsoft Office.

Students may log in at <http://portal.office.com> with their MCW email address and password. Mobile apps are also available.

Security

1. Students are responsible for the content of what is sent to their MCW email accounts in accordance with the [Email Usage Policy \(IT.IS.040\)](#).
2. The protection of an individual's privacy is one of the most important responsibilities of all faculty members, staff, and students at MCW. By [policy](#), protected information that might exist on portable electronic devices such as tablets, smartphones, and laptops must be safeguarded.
3. All MCW students share in the responsibility for protection against threats to the integrity and confidentiality of the MCW network and systems. Students are responsible for all activities performed under their MCW-issued username and password. Students should never disclose their MCW network password to anyone, including MCW Information Services (IS) staff.

Email

MCW provides email service for all of its students. Since this is the official delivery system of information to students, MCW has given each student an email address to be used for official MCW business. The MCW email address is used for official communication. Students are required to monitor their MCW email account for important notices. Students can access MCW email via the Outlook Web App, which is found at <https://outlook.office365.com/>.

Microsoft Authenticator is a [multi-factor authentication tool](#) that is used only for Microsoft services (Microsoft Office applications, SharePoint, Office Online). This tool will be used in addition to Duo, which will continue to be used for other MCW services (Box, Citrix, Qualtrics, etc.) Microsoft Authenticator MUST be used when on or off the MCW network.

Student MCW email accounts will be active until 90 days following graduation at which time the accounts will be disabled.

Self-Service Password Reset

The self-service password reset tool uses claims-based identity which allows students to reset or unlock their MCW password without needing to contact the MCW-IS Service Desk. To use the tool, students must first [enroll in the service](#). Once set up, students can reset the password at <http://password.mcw.edu>.

System Status

For the current status of systems and services on the MCW network, visit <https://infoscope.mcw.edu/is/status.htm>. Information Services also maintains a Twitter feed for announcing service interruptions: [@MCW IS](#).

Wireless Network

Students can stay connected while on campus with mcwWiFi, an encrypted network they can access using an MCW username and password.

Guests can access mcwWiFi with the username of *wifiguest*. Guests can call (414) 955-3333 for the current password for guest access.

Support

For support with mcwWiFi, multifactor authentication (Duo Security), best effort laptop technical help, or Student Laptop Program support, contact:

MCW-IS Service Desk (414) 955-4357, option 8

help@mcw.edu

Office M0300, basement level in the Medical Education building

7:00 a.m. to 5:00 p.m., Monday through Friday (except MCW holidays) After hours support is available for MCW password resets.

For support with D2L/Brightspace, ExamSoft, Top Hat and student required mobile device apps, contact:

Office of Educational Improvement Educational Technology

(414) 955-4290

exams@mcw.edu or lmshelp@mcw.edu

Office M3200, hallway between Medical Education Building and HUB 8:00 a.m. to 5:00 p.m., Monday through Friday (except MCW holidays) *Personal appointments available by request*

Academic Information and Policies

Academic Standing

All students are expected to maintain satisfactory academic progress, specific to the standard established within each school, as published in the respective school or program handbook.

Any student failing to meet the standards for academic progress or professional conduct will be reviewed by the academic standing committee appropriate to the school of enrollment.

Professional ethics and appropriate personal and professional conduct are essential to the culture of MCW and practice as a biomedical or health care professional. Unethical and/or inappropriate behavior will be considered by the committee in its advancement of academic standing deliberations.

In addition to the aforementioned academic standing policies, MCW complies with Title IV (Financial Aid) regulations; see the [Satisfactory Academic Progress policy](#) for more information.

Add/Drop Classes

School of Graduate Studies

Students may add/drop classes in the Graduate School no later than five days after the start of the class. The add/drop dates appear in the [academic calendar](#).

School of Medicine

Students may [add/drop](#) classes in the School of Medicine by the 15th day of the month, two months preceding the start of the class. Thereafter, students must seek approval of the Associate Dean of Student Affairs.

School of Pharmacy

The School of Pharmacy registers students for all classes. Students may not drop individual courses that are required for completion of the PharmD degree program.

Auditing Courses

The School of Graduate Studies permits students to audit courses. Students may [request audit status](#) during the period extending from the first day of class through the time period that consists of a total of 10% of the length of the class. Students who audit course(s) are expected to attend and participate in class meetings but are not required to complete written assignments or examinations. Students who audit course(s) but do not attend class meetings will have their registration in the course relinquished.

The School of Medicine permits students to audit only academic enrichment courses (ACEN).
The School of Pharmacy does not allow degree-seeking students to audit courses.

Classification

Promotion to the next level of study is contingent upon successful completion of prerequisite coursework and demonstration of appropriate professional conduct in each program. Promotion may be subject to further review by the committee responsible for academic standing and progression in the respective school.

Graduate student progression is based on completion of degree requirements which vary by program while medical and pharmacy student progression is based on credit hours earned as follows:

School of Medicine – MCWfusion Curriculum

Milwaukee

Phase 1 0-67.999

E1 0-27.99

E2 28-53.999

E3 54-67.99

Green Bay & Central W

Phase 1 0-73.999

N1/Y1 0-28.999

N2/Y2 29-49.999

N3/Y3 50-73.999

School of Medicine – Discovery Curriculum

Central Wisconsin

- W1 0 – 45.999 credits
- W2 46 – 102.99 credits
- W3 103 – 144.99 credits
- W4 \geq 145 credits

Green Bay

- G1 0 – 45.999 credits
- G2 46 – 98.999 credits
- G3 99 – 141.99 credits
- G4 \geq 142 credits

Milwaukee

- M1 0 – 41.999 credits
- M2 42 – 84.999 credits
- M3 85 – 121.999 credits and passing score on Step 1
- M4 \geq 122 credits

Master of Science in Anesthesia A1 0 – 41.999 credits

- A2 42 – 81.499 credits
- A3 \geq 81.500 credits

School of Pharmacy

- P1 0 – 32.499 credits
- P2 32.500 – 84.999 credits
- P3 85 – 138.999 credits
- P4 \geq 139 credits

Applicants who wish to audit courses without earning credits must apply and seek admission as a non-degree seeking student.

Concurrent Enrollment

MCW offers demanding programs in the allied health professions, biomedical sciences, medicine, and pharmacy. To properly advise and support students in these programs and to preserve the integrity of MCW degrees and programs, this policy addresses concurrent enrollment at other institutions and/or in multiple MCW programs.

Concurrent Enrollment:

- Occurs when a student enrolled at MCW is simultaneously enrolled at another institution.
- Occurs when a student enrolled in a degree program at MCW simultaneously pursues another degree program at MCW.

Dual Degree: a dual degree program leads to two degrees conferred concurrently or consecutively when credits earned at one institution or in one program count toward a degree at another institution or in another program. For instance, a student may complete graduate coursework that applies to both a bachelor's degree and a master's degree. For example, the MPH program offered by MCW at Mount Mary University and St. Norbert College allows students to enroll in MCW courses as undergraduates. The students may apply the MCW credits towards their bachelor's degrees as well as towards their MPH degrees.

Joint Degree: a joint degree is conferred concurrently by two institutions that share in educating students in a discipline. For instance, the joint PhD in Biomedical Engineering is awarded by both Marquette University and the Medical College of Wisconsin.

Full-time students may not concurrently enroll in a degree program at another institution without permission of the provost who, in consultation with the student's dean, must approve of the student's program and courses at the other institution prior to enrollment. If approved, the student may enroll only in graduate or professional level courses. This policy excludes approved dual degree and joint degree programs at institutions with which MCW has a formal agreement. Please refer to school-specific policies for limitations on the transfer of credits.

A student may not concurrently enroll in more than one degree program at MCW without permission of the provost. This policy excludes approved programs such as MD/MPH, MD/MS, MD/PhD, etc.

The pursuit of concurrent multiple degree outside of approved programs may have financial aid and other implications.

Contact Information and Location

All students who are registered for classes and those who are on a temporary withdrawal (leave of absence) are required to have complete contact information on record with the Office of the Registrar. This contact information should include at least one complete and current address and one complete and current telephone number for the student, as well as at least one complete name, current address and current telephone number for an emergency contact such as a friend or relative.

The Medical College of Wisconsin, the Office of Academic Affairs, the schools and the academic programs use this information to communicate with students about their enrollment, financial aid and tuition, among other reasons, or as required by a court order or subpoena, as required by federal regulations (e.g., for loans or 1098-T tuition credit tax statement, and/or in health or safety emergencies).

Students must enter their contact information directly in [MCWconnect](#) by navigating to Personal Information in the MCWconnect Self Service menu.

Students who do not comply with this requirement will have a hold placed on their records on or about September 1 for fall term, February 1 for spring term and June 1 for summer term. The hold will restrict all future registration until such time the student is compliant with this policy. After a hold is placed on the record, it is incumbent upon the student to notify the Office of the Registrar when contact information is complete and up to date.

In compliance with U.S. Department of Education regulations, MCW determines each applicant's location on the basis of the applicant's mailing address at the time of application. Further, MCW determines each student's location on the basis of the student's mailing address at the time of matriculation, and on the basis of any subsequent address changes as recorded in MCWconnect.

Course Evaluations

Professionalism, as one of MCW's Global Competencies, is expected of all students. The institution is committed to providing students with outstanding educational experiences to support their career preparation. In order to continuously improve its educational programs, MCW regularly seeks student perceptions regarding their educational experience. In accordance with the professionalism competency, each academic program expects or requires that students complete all evaluations within the established timeframes providing honest and constructive feedback as appropriate.

School of Graduate Studies

- All students taking courses for credit are required to complete evaluations.
- The time frame in which students complete evaluations is recorded.
- Students will be fined \$100.00 for each missing course evaluation.
- Failure to complete evaluations by the stated evaluation time frame may result in additional sanctions.

School of Medicine

- All students taking courses for credit are required to complete course evaluations. The time frame in which students complete evaluations is recorded.
- Students who do not complete course evaluations may have indicators added to their student records reflecting non-compliance with professional expectations. This may be used as commentary in the Medical Student Performance Evaluation letter.
- Failure to complete evaluations by the stated evaluation time frame will result in a grade of "IE" (standard grade scale) or "IV" (satisfactory/unsatisfactory grade scale) for incomplete, pending completion of the course evaluation. If the course evaluation is not completed by January 31 for the immediate, preceding fall term or July 31 for the immediate preceding spring term, the IE or IV grade will be converted to a grade of F or U, respectively.

School of Pharmacy

- Per Accreditation Council for Pharmacy Education standards, all students taking courses for credit are expected to complete evaluations.
- Evaluations of courses and instructors will occur each academic session.
- Except under special circumstances, adequate time will be scheduled for evaluation completion.

Credit Hour

General

In accordance with the U.S. Department of Education's regulations and the definition of a Carnegie unit, MCW assigns credit hours as a unit of measurement. MCW awards credit to students who successfully complete required coursework which may include clinical rotations, conferences, labs, research, and study.

For example:

- 18 hours of lecture and exams equals one credit hour.
- 36 hours of course activities such as conferences, demonstrations, or labs equals one credit hour.
- 90 hours of external work including research and study equals one credit hour.

A student may not receive credit and a stipend for coursework; however, a student may receive credit and a stipend for reasonable travel expenses related to the coursework.

Enrollment

Status	Fall and Spring Terms	Summer Term (School of Graduate Studies only)
Full Time	9.000 or more credits	6.000 or more credits
Three Quarters Time	6.750 – 8.999 credits	4.500 – 5.999 credits
Half Time	4.500 – 6.749 credits	3.000 – 4.499 credits
Less Than Half Time	0.500 – 4.499 credits	0.500 – 2.999 credits

School of Medicine

The Liaison Committee on Medical Education (LCME) has in place certain standards which require careful evaluation of students in all aspects of medical education. The Medical College of Wisconsin abides by such standards and follows longstanding practices at medical schools nationwide in which one credit hour is assigned to each week of clinical rotation.

For example:

- 4 weeks in the family medicine rotation equals 4 credit hours.
- 6 weeks in the pediatric medicine rotation equals 6 credit hours.
- 8 weeks in the clinical surgery rotation equals 8 credit hours.

In accordance with the Liaison Committee on Medical Education Standard 8.8, the School of Medicine has established a policy on limitations in student work hours during clerkship rotations that was approved by the Curriculum and Evaluation Committee. Clerkship coordinators and directors monitor student work hours to assure compliance. These hours represent clinical hours, and not hours spent studying or working on other rotation or self-study projects.

Distribution of Educational Materials

Faculty members create educational materials with the aim of providing an excellent education for MCW students. The digital format of educational materials heightens concerns about ownership, use and liability for unapproved uses of educational materials. More specifically, with the digital nature of the educational materials (e.g., audio files, PDFs, online examinations), students can easily download and export, edit/revise and circulate files beyond the intended use for MCW students.

Educational materials are defined as exams, lecture notes, outlines, homework assignments, PowerPoint presentations, study guides, audio, video and/or digital files and/or any material prepared by MCW faculty for use in their courses.

The following policy applies to all educational materials created by MCW faculty spanning all courses, rotations, and clerkships, as well as other educational venues (e.g., M3 Benchmark OSCE, PDA applications and simulations; presentations to student interest groups).

1. All educational materials and their associated digital files are exclusively for the use of students enrolled at MCW, for their personal use.
2. The files are not to be shared/exchanged and/or distributed without the written permission of the course/clerkship director and the authoring faculty member(s).
3. The material is copyrighted by the Medical College of Wisconsin and is not to be altered, used for purposes other than that intended by the author, and/or sold without the permission of the course/clerkship director and the authoring faculty member(s).

Failure to comply with these use standards will be addressed under MCW's policy on Professional Misconduct and may result in disciplinary sanctions up to and including dismissal.

Examinations

MCW schools or programs may have separate exam policies other than that which is contained herein. In such instances, these policies may supersede or supplement the following policy, and in such instances will state as much and be contained in the applicable school or program handbook or other education program materials.

Administration of Exams

Administration of exams may occur in person or remotely. Students should refer to all in person and remote policies set forth by their specific school or program. The following policies communicate general standards unless otherwise noted. Note that the MCW Exam Team only provides support for remote exams at this time.

1. Students should not carry unauthorized personal items and/or devices into the testing space. These items include but are not limited to the following:
 - a. Cellular/mobile phones
 - b. Watches with alarms, computer or memory/recording capabilities
 - c. Paging devices
 - d. Recording/filming devices
 - e. Reference materials (e.g., books, notes, papers)
 - f. Backpacks, briefcases or luggage
 - g. Beverages or food of any type (except for medical reasons, see below)
 - h. Coats, outer jackets, hooded clothing that can be converted to headwear or ones with a built-in head cover, scarves
 - i. Headwear Accommodation Requests for exception to wear religious attire may be submitted to one's program representative.
 - j. Electronic devices (iPads, computers) are restricted to those required to take examination in ExamSoft.
 - k. Calculators can only be brought to examinations if specifically permitted by the course director. Students would be notified prior to examinations whether calculators would be permitted.
2. Students will take course exams on their working laptops compatible with the ExamSoft platform. Students are required to download the exam file for each exam in advance of the exam report time. Students are required to bring their MCW student ID, laptop, power cord, and ear buds/headphones, when required, to the exam. All personal items, other than those previously identified, should be removed from the testing area in accordance with the Exam Policy. For an emergency situation, loaner laptops, privacy screens and technology assistance can be obtained from the Exam Technology team at the entrance to the exam room.

3. For remote exams, students will be permitted to leave the examination to use the restroom once per hour of examination time for a maximum of 5 minutes per restroom break. The student should announce to the laptop camera they are stepping away for a restroom break. The timer for the exam will continue during restroom breaks. In other words, students taking a break will not be allotted additional time to complete their exams. The ExamMonitor software will record the time that a student is absent from the room during examinations, and it will be determined during the review process if the time absent was reasonable. These breaks are solely for the purpose of using the restroom, thus students are not permitted to visit other areas and should not communicate with others while on break.
4. Any student exhibiting unusual behaviors during exams will be required to meet with the appropriate school official.
5. In the event a student may require food or beverage during an examination period due to medical necessity, these items should be identified to the camera at the beginning of all remote exams during the scanning of the room. The exam time allotted will not be extended in these cases. The respective school should be notified by students of this requirement in writing at the beginning of the year for known medical issues but should be communicated before starting a new course or at least one week prior to examinations, if applicable, with new medical conditions. A letter from a licensed medical provider may be requested to support this exception to standard examination rules. In the case of recurring need to have food/beverage available due to medical necessity, the request will only need to be made once sometime before the first examination and approval will carry over to subsequent examinations during the academic year. Subsequent requests will need to be made at the beginning of the next academic year.
6. If a student arrives late for a remote examination, the student's start time will be recorded and sent to the appropriate school official.

Students Arriving Late

1. The appropriate Course Director or their representative(s)/coordinator will clearly communicate the expected exam start time for students. Students should be in the exam area prior to the expected exam start time to assure “on-time” arrival on examination days.
2. For remote exams, the Exam Team will clearly communicate the starting time for each exam via an MCW Exam Team email. This email will be sent to all student 36-48 hours prior to their exam. In an event the email will not be sent within the 36–48-hour timeframe prior to the exam, students will be notified by the course coordinator. Students are expected to download the exam as soon as it is available to ensure there are no technical difficulties on exam day. On exam day, the remote exam password will be released 20 minutes prior to the exam start time via a Brightspace announcement in the exam’s corresponding course. Students can start the exam as soon as they see the password.
3. Students starting a remote examination after the expected start time will be considered late. Their actual start time will be recorded by the Examsoft system and sent to the appropriate school officials.
4. The appropriate Course Director or the chief proctor has authority to decide how to manage a student arriving late for an exam. In accommodating the late student, every effort will be made to minimize the disruption to other students taking the exam.
5. Starting late for exams is an issue of professionalism. After the exam, students starting late may be required to meet with the course/unit director, or curriculum Assistant Dean. The course/unit director or curriculum Assistant Dean may choose to address this issue with additional actions, such as reduction of exam scores or course grades, and/or meetings with the appropriate school officials in cases of unprofessionalism or recurrent tardiness to examinations.
6. Students should adhere to all additional late arrival guidelines and policies for their specific school and/or program.

Computerized Examinations

1. Students are responsible for understanding the mechanics of examination navigation and submission.
2. Students are responsible for bringing a well-maintained personal laptop, power cord, and login credentials to the examination. Students who fail to bring this equipment may be penalized at the discretion of the chief proctor.
3. All students, by taking the examination, acknowledge and consent to the following, which will appear on the computer screen at the beginning of each examination administration:
All of the test items used are owned by the department administering the examination. Any reproduction of the materials or any part of them through means including, but not limited to, photocopy, dictation, photography or reconstruction through memorization and/or dissemination (oral or written) in any form to any individual and/or party, is prohibited and constitutes a violation of the Professionalism Policy.

4. An on-screen calculator, highlight function, cross-out function and list of normal lab values will be provided for examinations.
5. Exam software records date and time stamps for all student activity within the exam software including, but not limited to, start time, answers selected, questions skipped and exam submission, and may be used to address appeals.
6. At the discretion of the proctor, the format of the examination (computer v. non- computer) may be changed, or the examination may be rescheduled even when an examination is in progress.
7. The exam software displays the amount of time remaining for an examination. At the end of the examination's allotted time the exam software will automatically submit one's answers. At the discretion of the course/unit director, the percentage and/or raw score(s) may be displayed upon submission of the exam.
8. Technology support resources can be obtained by contacting the Exam Team at exams@mcw.edu. Be aware that the Exam Team may not be on-site for all in-person examinations. It is advised to prepare for exams ahead of time to allow for troubleshooting and/or arrange for accommodations.

Rules for Examination Review and Appeals

The rules for examination review and appeals may be found in the respective school's handbook.



Grading

Each school at the Medical College of Wisconsin utilizes a grading system specific to the education mission of the programs it offers.

School of Graduate Studies and Master of Science in Anesthesia Program:

MCW Grades:	MCW Quality Points:	Grades with no Quality Points:
A	4.00	AU Audit
A-	3.70	E Excellent
B+	3.30	F* Fail, Pass/Fail course
B	3.00	G Good
B (R)	3.00	I/IC Incomplete
B-	2.70	P* Pass, Pass/Fail course
C+	2.30	S Satisfactory
C	2.00	SD Substandard
C-	1.70	S (R) Satisfactory
F	0.00	TR Transfer
WF	0.00	U Unsatisfactory
		W Withdrawn

Joint Program in Biomedical Engineering with Marquette University	
MU Grades:	MU Quality Points:
A (M)	4.00
A- (M)	3.67
B+ (M)	3.33
B (M)	3.00
B- (M)	2.67
C+ (M)	2.33
C (M)	2.00
C- (M)	1.67
F (M)	0.00
NG (M)	No Grade

The grade of B(R) or S(R) denotes remediation by exam in the MSA program.

School of Medicine:

Grades:			
AU	Audit	C	Complete
H	Honors	EX	Exempt
HP	High Pass	I/IC	Incomplete
P	Pass	IE/IV	Incomplete, pending student completion of course evaluation
LP	Low Pass	NC	Not Complete
F	Fail	NG	Not Graded
S/SY	Satisfactory		
U/UY	Unsatisfactory		
W	Withdrawn		
Y	Year, assigned to a course that spans academic terms and/or years that may be replaced with a final letter grade		

School of Pharmacy:

Grades:	
AU	Audit
H	Honors ($\geq 95\%$)
I	Incomplete
S	Satisfactory (75%-94%)
U	Unsatisfactory ($< 75\%$)
W	Withdrawn
Y	Year, assigned to a course that spans academic terms and/or years

Notes:

The School of Medicine and the School of Pharmacy do not calculate grade point averages. Effective with the matriculating class of fall 2019, the MSA program no longer calculates grade point averages and utilizes a Pass/Fail scale with grades of S or U.

Effective fall 2018, a course with subject of AWAY is a course taken at another institution by arrangement, graded by the host institution and submitted to MCW.

Effective fall 2018, repeated courses are coded as such in the 'R' column of the transcript. A value of 'E' indicates the course is excluded from the GPA while 'I' indicates the course is included in the GPA when calculated.

Effective fall of 2016, Pass/Fail courses are graded S or U in the School of Medicine; Pass/Fail courses prior to that term were graded P or F.

Graduation and Commencement

MCW takes great pride in graduating degree candidates from the School of Graduate Studies, the School of Medicine and the School of Pharmacy every year. Commencement is a time to celebrate the achievements of students, honorary degree recipients and alumni. It is a dignified and time-honored ceremony and tradition. As such, this policy addresses eligibility for and timing of graduation, participation in Commencement exercises, academic regalia and diplomas.

Eligibility for and Timing of Graduation

- Degree candidates must apply to graduate via MCWconnect by the posted deadline.
- Once students complete all degree requirements, they must be graduated without delay. Students who wish to remain enrolled must apply to another program or seek non-degree status.
- MCW confers degrees on the last business day of each month throughout the year, and at Commencement ceremonies in May (Milwaukee), May or June (Central Wisconsin and Green Bay) and December (Milwaukee), as determined by campus and programs.

Participation in Commencement Exercises

- All graduating students are encouraged to attend Commencement exercises.
- Graduating students are expected to attend the Commencement exercises at the campus where their degree requirements are earned.
- Joint degree candidates are expected to attend the Commencement exercises of their home institution and may attend the Commencement exercises of the host institution for their program, per the policy of the host institution.
- Graduating students who complete degree requirements after fall Commencement and before the following spring Commencement, may participate in spring term Commencement. Exceptions to this rule are at the discretion of the designated campus or school dean.
- Graduating students who complete degree requirements after spring Commencement and before the following fall Commencement, may participate in either fall Commencement or the following spring term Commencement. Exceptions to this rule are at the discretion of the designated campus or school dean.

- For planning purposes, graduating students who wish to be excused from participation in Commencement exercises must email the campus or designated school dean at least one week prior to Commencement.
- The schools, and in some cases specific programs, administer an oath to graduating students at Commencement. Students who do not attend Commencement may make arrangements to complete the oath with the designated campus or school dean.

Academic Regalia

- Degree candidates who choose to participate in Commencement exercises must order academic regalia from MCW by the posted deadline and must wear the MCW-issued academic regalia at the ceremony. Each respective school will communicate instructions to graduating students for distribution of academic regalia.
- Academic regalia consists of a cap, tassel, gown and hood.
- Adornments to academic regalia, such as honor cords, sashes and stoles, must be approved by the MCW Commencement Committee and issued by an administrative office or school within the Medical College of Wisconsin.
- Graduating students may not alter or decorate their caps, tassels, gowns or hoods, or add other adornments not approved by the Commencement Committee and issued by an MCW school or administrative office.
- Academic regalia is not available for purchase from MCW. Graduates who are interested in purchasing academic regalia must contact the vendor directly for packaging and pricing.

Diplomas

- MCW issues one, and only one, paper diploma to each graduate per degree earned, as well as an electronic copy of the diploma per degree earned.
- Diplomas include the graduate's first name, middle initial and last name, the degree earned, academic honors (if applicable), location and the date of graduation which may differ from the date of Commencement, particularly for those students who graduate on the last business day of a month, between Commencement ceremonies.
- Diplomas may not be distributed to students who have certain holds on their records, or to students who have not turned in their academic regalia, until such issues are resolved.
- Under no circumstances will diplomas be distributed in advance of the respective graduation date.
- In the event of damage or loss, replacement diplomas are available for a fee. See the [Office of the Registrar's website](#).

Honor Code

“As students of health care and research professions, each will demonstrate, both individually and collectively, honest, ethical and responsible behavior in all academic endeavors, clinical experiences, and other interactions with colleagues, patients, staff and collaborators along the path to becoming a professional.”

All Medical College of Wisconsin students tacitly agree to adhere to this Honor Code upon matriculation, maintain it through graduation and hopefully the rest of their careers. Because of this agreement, students will uphold the highest standards of academic integrity and professionalism as presented in more detail below. Students understand that members of the MCW community must be active enforcers of this Honor Code. As such, if they witness or perceive a violation of the Code, they must report the incident to a faculty/staff member or they will also be in violation of the Honor Code. It is a violation of the Honor Code and MCW policy to provide false information to any MCW official.

Professionalism Expectations

Honest, ethical, and responsible behavior is as essential to the scientific and health professions as it is to academic excellence and scholarship. For students, such behavior is necessary in all areas of the educational experience, including, but not limited to: academic coursework, scientific research, ethical use of information, and relationships with peers, including active or perceived threats of retaliation. It is incumbent on all members of the academic community to uphold high standards, to monitor these standards, and to bring to appropriate school administrators concerns regarding dishonest, unethical, or irresponsible behavior.

Students understand that actions in violation of MCW’s Professional Conduct policies, Academic Integrity policy and/or this Honor Code may result in disciplinary actions.

See also [MCW Code of Conduct](#)

Academic Integrity

Academic integrity is essential, not only to accurately assess the performance of students, but also to respect the faculty and staff who have dedicated their time to teaching. Students have an individual duty to uphold this ideal of integrity and therefore, must abstain from cheating and other dishonest behavior in regard to any activity, work, or production which affects the grade or perception of any student. This includes, but is not limited to, examinations, graded assignments, and classwork. Academic dishonesty is defined as, but not limited to:

- Copying or discussing answers during examinations, including electronic, written, oral or take-home exams
- Collaborating during online, written, oral or take-home exercises unless explicitly permitted by faculty
- Logging in to ARS, TopHat or other polling system and claiming to be someone other than oneself
- Using non-permitted materials, such as notes, books or electronic devices, during any exercise that impacts students' grades unless explicitly permitted by faculty
- Copying work that is not one's own, fabricating or falsifying assignments, research data, patient write-ups or other materials
- Preventing other students' access to reference materials or other study materials
- Reproducing any part of test materials through means including, but not limited to, photography, copying, reconstruction through memorization and/or dissemination in any form to any person or party
- Failing to respect copyright and means for distribution within faculty and staff expectations
- Exploiting technology and/or technological malfunctions for individual or group benefit, colloquially known as "abusing the system"

In addition, staff, faculty, proctors and students have an obligation to maintain a non-disruptive environment during examinations to the best of their abilities. By default, students should assume that graded assessments are performed individually unless told otherwise. Faculty and staff also have an obligation to communicate with students when collaboration is or is not appropriate.

Professionalism

Professionalism is an important part of maintaining integrity in healthcare and research. Below is an outline of how students may maintain professionalism in their responsibilities and relationships in school, at practice sites, and beyond. This list is by no means exhaustive.

- Commit to achieving the highest possible competency for oneself and peers.
- Be mindful that each student is representative of their profession through language, appearance, and interactions with peers, patients and teachers.
- Take responsibility for both good decisions and mistakes in an honest manner and make corrections as needed. Accept and consider constructive criticism; take care to recognize one's limitations and seek assistance when in need. Prioritize patient well-being above your academic and/or personal interests.
- Be respectful of peers, patients, and teachers of differing backgrounds, opinions, values and lifestyles.
- Actively participate in patient care when possible, and work to meet the expectations of your teaching superior.
- Breaches of professionalism include, but are not limited to, the following:
 - Being disrespectful or participating in bullying, including cyber bullying, of peers, teachers, patients or staff in any setting, including but not limited to: in-person interactions, online and on social media
 - Avoiding responsibilities in the classroom, lab or in patient care
 - Avoiding addressing one's mistakes or attributing false blame
 - Violating any established dress code
 - Being late to clinic, disregarding punctuality, or disrupting class
 - Falsifying or fabricating physical exam, lab, other clinical findings, or research under any circumstance
 - Violating patient's physical privacy or information privacy as protected by HIPAA
 - Engaging in any behavior that is, or could be, perceived to be harassing in nature
 - Engaging in conduct that causes, or could be perceived to cause, a hostile environment or the discomfort of another student, employee, patient or visitor
 - Engaging in any unwelcome sexual or physical conduct of any kind with others
- Students are responsible for adhering to such [MCW corporate policies](#) as:
 - [Advocacy Activities/Official Spokesperson](#)
 - [Facilities, Use Of](#)
 - [Solicitation, Distribution of Literature, and Facility Access](#)

Libraries

MCW provides robust library services to students to assist them in academic endeavors.

Central Wisconsin

Students at the MCW-Central Wisconsin campus have access to multiple library facilities to obtain any print materials beyond MCW's vast digital library.

- [MCW-Central Wisconsin Library Resources](#)
- [Dr. Joseph F. Smith Medical Library at Aspirus Hospital](#)
- [Marathon County Public Library](#)
- [Northcentral Technical College Eiffel Holm Memorial Library](#)

Green Bay

Students at the MCW-Green Bay campus have access to the [Mulva Library](#).

Milwaukee

The MCW-Milwaukee Libraries consist of the central Todd Wehr Library, located in the Health Research Center, and two hospital-based libraries. The Froedtert Hospital Library is located on the second floor of the Froedtert Specialty Clinics building. The Children's Wisconsin Library is located on the second floor of the Children's Clinics building. More information, links to online resources and current updates about the Library are available on the Library [website](#) or at asklib@mcw.edu.

Maltreatment

The Medical College of Wisconsin is committed to holding the organization, including faculty, staff, trainees and students, to the highest possible standards. From time to time, individuals may have questions or concerns regarding mistreatment that must be addressed to optimize their work and learning.

Examples of mistreatment include but are not limited to: sexual harassment; discrimination or harassment based on race, religion, ethnicity, gender, gender identification, sexual orientation, physical disability or age; purposeful humiliation; psychological or physical punishment; any form of retaliation; and the use of grading or other forms of assessment in a punitive manner.

Any person may report mistreatment at any time. If the aggrieved party is comfortable doing so, every attempt should be made to resolve the matter directly with the alleged offender. If further action is required or as an alternative to working with the alleged offender, the aggrieved party may file a formal report using one of the following means:

1. Contacting their respective school's Office of Student Affairs
 - a. School of Graduate Studies Student Affairs Neil Hogg, PhD (414) 955-4012 nhogg@mcw.edu
 - b. Medical School Student Affairs – MD Program
Raj Narayan, MD (414) 955-3636 rnarayan@mcw.edu
 - c. Medical School Student Affairs – MSA Program Daniel Garcia (414) 955-5607 dgarcia@mcw.edu
 - d. Pharmacy School Students Affairs
Sonia Escamilla (414) 955-7476 pharmacy@mcw.edu

Students who are uncomfortable filing a report through their respective school's Office of Student Affairs may file a report with MCW's Assistant Provost for Student Affairs.

Jennifer Kusch, PhD, MS, MPH (414) 955-4860 jkusch@mcw.edu

2. Submitting a complaint through MCW's third-party Compliance Reporting Hotline:
 - a. To submit a complaint by phone, call: (844) 703-8171
 - b. To submit a complaint online, complete the form available at:
<https://secure.ethicspoint.com/domain/media/en/gui/61161/index.html>

Anonymous reporting is optional.

Reports will be acknowledged within 24 hours. No person will be subject to any adverse action for reporting what they honestly believe is a maltreatment violation. For more information, refer to [MCW Students Concern Navigation](#).

Procedures for Responding to Academic Dishonesty and Lack of Professionalism

Additional policies or procedures may exist in each school's handbook. Reprimands are made in writing and will become part of the student's education record. A reprimand will include the statement that continuation or repetition of misconduct may result in a more serious disciplinary action.

1. Disciplinary Probation: formal action that establishes conditions upon a student's continued attendance for failure to comply with MCW, school or program standards. Students will be notified, in writing, of the probation and conditions thereof. Disciplinary probation warns the student that any further misconduct may result in more serious disciplinary action, including dismissal and results automatically in loss of institutional financial support. Probation may be imposed for a specific length of time or until graduation.
2. Suspension (mandatory temporary withdrawal): formal action that defines a specific period of time during which the student may not attend classes or engage in research, consequent to a breach of MCW, school or program standards. Students will accrue no academic credit any coursework in progress (including Reading and Research) when the suspension becomes effective. Students will be notified, in writing, of the suspension and conditions thereof.
3. Dismissal: formal action that results in a student's permanent separation from the Medical College of Wisconsin. Dismissal will only occur following a formal hearing as outlined in the school's academic standing policies and procedures. Dismissal for academic and/or disciplinary reasons will be posted to a student's transcript.

Registration

Registration for fall term begins in April while registration for spring and summer (Graduate School only) terms begins in October of each year. See the Academic Calendar and the Add/Drop section of this bulletin.

Repeating Courses

Students who must repeat academic courses may do so following the policies and procedures outlined by their respective school. All attempts will appear on the student's transcripts, however, the highest grade earned in a course will be used when calculating the student's grade point average (GPA), when applicable. Students must register for all repeat courses in a term and session in which the course is officially offered. This policy does not apply to courses which are designed to be taken multiple times.

Time Limits

Each school within MCW has limits on time to completion for individual programs of study. All programs start with the date of matriculation and are inclusive of temporary withdrawals.

School of Graduate Studies

Program	Standard	Maximum
Doctor of Philosophy (PhD)	Varies	7 years
Doctor of Public Health (DrPH)	3 years	5 years
Master of Arts (MA)	Varies	4 Years
Master of Science (MS)	Varies	4 years
Master of Medical Physiology (MMP)	1 year	3 years
Master of Public Health (MPH)	Varies	5 years
Certificate	Varies	2 years

School of Medicine

Program	Standard	Maximum
Doctor of Medicine (MD)	4 years (can be 3 years at the regional campuses)	6 years
Doctor of Medicine (MD) Milwaukee + Master of Public Health (MPH)	5 years	6 years
Doctor of Medicine (MD) Milwaukee + Master of Science (MS)	4 years	6 years
Medical Scientist Training Program: Doctor of Medicine (MD) Milwaukee + Doctor of Philosophy (PhD)	7 years	9 years
Master of Science in Anesthesia (MA)	28 months	40 months

School of Pharmacy

Program	Standard	Maximum
Doctor of Pharmacy (PharmD)	3 years	5 years

Transfer of Credits

The number of credit hours which may be transferred from other institutions is limited to protect the integrity of the Medical College of Wisconsin. Only credits directly applicable to a student's MCW degree program will be considered for transfer. There is no guarantee that credits will be approved for transfer. Students should consult their advisor(s) or program director before requesting transfer of credits earned elsewhere *and* before taking additional courses for which they may want to transfer credits. Additional information regarding the transfer of credits may be found in each school's handbook.

- No external grades may be transferred into MCW.
- No credit shall be awarded by MCW for transfer courses in which earned grades are below passing.
- Credits applied to another program for which a degree was earned are not eligible for transfer.
- Credits earned must be from an institution accredited by an association recognized by the U.S. Department of Education and, when appropriate, by the accrediting organization that health professional program.
- Currently enrolled students who pursue external courses at an institution that is not part of an agreement with MCW, not a joint department, and not part of the American Association of Medical College's Visiting Student Learning Opportunities program must receive approval from their school prior to enrolling at the external institution. See Concurrent Enrollment policy.

Withdrawals

It may be necessary for a student to request a temporary (leave of absence) or permanent withdrawal from a program of study. When this occurs, the student may not participate in clinical rotations, coursework, projects or research for credit at MCW while on temporary withdrawal. A student may not return from a temporary withdrawal and immediately take a break period or vacation.

Active-Duty Temporary Withdrawal

MCW is committed to the Principles of Excellence, the HEROES Act, and fostering a supportive and military friendly environment for service members. MCW supports students called to active duty by encouraging them to continue their education when possible and to provide administrative support while deployed.

This policy pertains only to the time span that covers active duty. Students should contact MCW no later than six months after the end of active duty and within the time limit of the Principles of Excellence in order to return to school. Students returning from active duty in this timeframe will not be subject to reapplication for admission or late fees; nonetheless, students will be subject to all other applicable requirements and policies of the institution. Students will be readmitted with the same academic status as when they left, meaning:

- To the same program of study (or comparable if the program is no longer offered)
- At the same enrollment status
- With the same number of credit hours previously completed
- With the same academic standing as the time of withdrawal

Students will be charged the same tuition rate for the first academic year in which they return as the rate they would have been charged when they left the school. If MCW determines a student is not prepared to resume the program of study, reasonable efforts will be made to help prepare the student to complete the program.

The U.S. Department of Education defines active duty as the following: full-time duty in the active military service of the United States. This includes full-time training duty, annual training duty, and attendance, while in the active military service, at a school designated as a service school by law or by the Secretary of the military department concerned. This does not include full-time National Guard duty.

Parental Accommodations

MCW is committed to supporting all student parents in meeting their program requirements. Pregnant and parenting students face unique challenges during graduate and professional education, and accommodations for these students may vary depending on timing within their curriculum and program.

Title IX accommodations require that medically necessary absences for pregnancy and related conditions be excused.

Students who become parents through birth or adoption/foster may be provided course accommodations for a period consistent with what is medically necessary. Please note that accommodation plans may impact program completion timelines.

Accommodation requests may include but are not limited to: deadline extensions for coursework, postponed exams, rescheduled clinical rotations, excused absences from class, home study or ability to attend class virtually.

Students who adopt or have a child while a student at MCW may choose to take a temporary withdrawal before and/or after the child arrives. Given the unique intersection between program requirements and the uncertainties of pregnancy and the timing of a child's arrival, no one policy can address accommodations for every pregnant or parenting student. Students should be in contact with faculty, program directors and school administration to discuss accommodations that will maximize student wellbeing while minimizing disruption of the student's learning.

Students should contact the Title IX office for information regarding support of pregnant and parenting at MCW:

Title IX Coordinator

Katie Kassulke

(414) 955-8668

TitleIXCoordinator@mcw.edu

[School of Graduate Studies](#)

Angela Backus

(414) 955-5670 | abackus@mcw.edu

School of Medicine Central Wisconsin

Roy Long, PhD

(715) 870-0914 | rlong@mcw.edu

School of Medicine Green Bay

Dana Daggs

(920) 403-4501 | ddaggs@mcw.edu

School of Medicine Milwaukee

Dr. Raj Narayan

(414) 955-3636 | rnarayan@mcw.edu

School of Pharmacy Sonia Escamilla

(414) 955-7476 | sescamilla@mcw.edu

Support Services

Childcare Expenses

Financial aid in the form of federal loans for childcare expenses is available to students who qualify. Information is available from the [Office of Financial Aid](#), or via email finaid@mcw.edu.

Lactation Support

MCW is committed to providing lactating students with the accommodations necessary to ensure they have access to equal educational opportunities while also meeting their health needs. Direct chest/breastfeeding is permitted at any campus building or space that the lactating student and infant/child are otherwise permitted to be present. Students should make reasonable efforts to pump between classes or outside of instruction time. Lactating students who must pump during a portion of their class/lab/learning period should inform the instructor of the need and estimated time away from class in a timely manner. Students will not be penalized for their absence needed to express breast milk on campus. Students and instructors should work together to identify solutions for making up in-class work, participation credits, or other instruction missed.

MCW prohibits harassment or other discrimination against students. Harassment or discrimination related to breastfeeding or lactation should be referred to the Title IX office: TitleIXCoordinator@mcw.edu.

Students who are breastfeeding or pumping may be provided adequate accommodations. [Lactation rooms](#) are available on all campuses.

Students who need assistance managing their schedule and their pumping breaks should contact their school representative listed above.

Parking

MCW has adopted a preferred parking policy for pregnant individuals in their third trimester. To request access, eligible students must complete the [Pregnancy Preferred Parking form](#).

Malpractice Insurance Considerations for Withdrawn Students

Students who are on temporary withdrawal from MCW are not considered enrolled. The Medical College of Wisconsin will not assume any responsibility for any students who are not enrolled in any credit-bearing or degree-seeking coursework. Students may not participate in clinical rotations, coursework, projects or research while on temporary withdrawal.

Non-Academic Policies

Alcohol at MCW-Sponsored Events

Representatives of organizations interested in serving alcohol (whether on or off campus) which utilize institutional or student funds are required to obtain the "Serving Alcohol" policy and the "Permission to Serve Alcohol" form from the appropriate school's Office of Student Affairs and submit the form in person at a meeting with the appropriate dean or designee of the respective school. Prior to the meeting with the dean or designee, the organization must identify the person(s) who will be responsible at the party should alcohol consumption become a problem, and it should present its plan for promoting responsible conduct. Any approved alcohol at events must be served by a licensed bartender. Failure to comply with this directive may result in institutional action against the offending student organization.

Any allegations of non-compliance with the Alcohol Policy will be reviewed in accordance with MCW's Professional Conduct policy. Student groups and organizations whose activities result in a violation of MCW's Alcohol Policy will be held accountable and may be subject to disciplinary action.

Attire

Student attire is a reflection of professional identity. Students are expected to maintain a professional appearance at all times and may be counseled if their appearance interferes with the safety of the learning environment. Specific programs or clinical settings may require additional specifications for professional dress. Students must wear their MCW ID badge at all times.

Bulletin Boards (Milwaukee Campus)

MCW's bulletin boards in the MEB Stairwells and outside of the cafeteria are available for use by academic and administrative departments of MCW and health-related organizations for activities on health-related subjects and in furtherance of education and research, such as medical studies, study groups, approved MCW events, etc. Solicitations by for-profit organizations are not permitted either directly or indirectly by groups or one-on-one, nor by way of group presentations, nor through the use of flyers, handbills, etc. MCW may elect to permit display of works of art if recommended by the Office of Communications but will not permit their sale on its premises. Postings on MCW bulletin boards may not contain any representations or positions put forth by outside agencies. Personal postings are not allowed.

Bulletin Boards may be used by: MCW faculty and staff; Allied health, professional groups (e.g., specialty societies, dental societies, nursing organizations, etc.) or civic groups; For-profit organizations with contractual or other direct relationships with MCW (e.g., bookstore); Non-profit, community-wide agencies MCW supports; (UPAF but not the individual performing arts groups), or those directly linked to MCW or Medical Center activities (e.g., MACC Fund, Ronald McDonald House, etc.). All postings require prior approval by the Academic Affairs Administration. To approval of a posting, please email AA_Administration@mcw.edu. Approved postings will be stamped as such. Postings must list a designated contact person. Postings will be taken down after the event date or cleared from the board at the end of each month. Questions regarding this policy should be directed to AA_Administration@mcw.edu.

Communicable Disease Exposure

During the course of their training, students enrolled in health professional education programs may participate in education and training in direct patient care settings, clinical research settings, and research laboratories within an academic medical center, as well as in the community. By enrolling in health-related education and research programs, students will consequently be at increased risk for exposure to communicable and infectious disease.

It is the policy of the Medical College of Wisconsin to limit exposure to infectious agents through practice of Universal Precautions and to follow precautionary measures developed by the Centers for Disease Control (CDC) to reduce the risk of spread of infectious disease due to exposure to blood, bodily fluids tissue (e.g., blood, aerosolized droplets, lymph, saliva, semen, urine). MCW students are expected to follow these guidelines and MCW's corporate [Communicable Disease policy](#). By enrolling in a MCW educational program, students agree to follow the policies and procedures of MCW and those of its affiliated hospitals and clinical locations hosting students. This includes, but is not limited to, all environmental safety, laboratory safety exposure protocols and policies concerning the use of personal protective equipment (PPE).

By participating in health sciences educational programming and research, students participate in activities which may involve increased risk of exposure, including:

- Activities involving direct contact with patients and other individuals who may have communicable disease including highly contagious viral conditions such as novel coronavirus (e.g., SARS-CoV-2, COVID-19), influenza, staphylococcus aureus, mycobacterium tuberculosis, among others
- Work involving viral pathogens, including bloodborne pathogens
- Exposure to bodily fluids and tissues

As a result of exposure due to a student's own actions or those of others, students may be at risk for illness, physical or psychological injury, pain, suffering, disfigurement, temporary or permanent disability (including paralysis), economic or emotional loss, and/or death.

Students should be aware that even with precautionary measures and proper use of PPE, there is no guarantee or representation by MCW that a student will not contract one or more infectious diseases. While MCW takes all necessary steps and precautions to protect students, it is impossible for MCW to completely eliminate all of the risks posed by infectious disease.

Exposure to infectious disease is, therefore, an inherent risk in students' involvement in a health professional education or research program and in the work environment of health professionals and health researchers for which MCW is preparing health professionals.

By enrolling in an MCW educational program, students assume the risk of exposure to infectious disease and other injury which may occur.

Blood, Bodily Fluid, or Biohazard/Toxin Exposure: Reporting

Students receiving exposure to blood or bodily fluids should seek immediate medical care.

On weekdays from 8:00 a.m. to 4:30 p.m., students should immediately report the exposure by calling Occupational Health Services at (414) 805-6699.

Students who experience an exposure when Occupational Health Services is closed (evenings, nights, weekends) should report either to a Froedtert Administrative Representative (if at Froedtert) or to the emergency room of the hospital where the incident occurred. In addition, students must report the exposure to Occupational Health Services immediately after the office opens.

For students on rotations at hospitals or clinics outside Milwaukee, exposure should be reported immediately to the hospital employee health clinic or immediate supervisor. Students must report exposure to Occupational Health Services within 24 hours. For specific questions contact MCW Occupational Health Services at (414) 805-6699.

Codes of Conduct

All students will abide by the following:

MCW Corporate [Code of Conduct Policy](#) MCW Corporate [Professional Conduct Policy](#)

MCW Corporate [Information Technology Policies](#) MCW [COVID Pandemic Guidelines](#)

Criminal Background Check

Academic programs may require criminal background checks for students as a condition of their admission and/or continued enrollment at the Medical College of Wisconsin. Background checks which may be required for existing students are completed via the Castlebranch system and includes the Wisconsin Caregiver check. (Wis Stat. 50.065).

Drug-Free Workplace, School, and Campus

All students may be subject to drug testing for cause at any time. Students may be required to undergo additional drug testing as determined by experiential sites and/or as published in each respective school's handbook.

The Medical College of Wisconsin is committed to maintaining a drug-free work and campus environment in compliance with The Drug-Free Workplace Act of 1988 and the Drug-Free Schools and Communities Act of 1986. Alcoholic beverages may be served on MCW premises at corporately sponsored (i.e., those sponsored by MCW and/or its departments) functions and then only in accordance with Wisconsin Law.

The unlawful manufacture, distribution, dispensing, possession or use of controlled substances, illicit drugs and alcohol by employees and students on MCW property or as part of MCW activities is prohibited.

Email

The official means of communication between MCW administrators, faculty, staff and students is MCW email. As a result, students are required to use MCW email for all MCW communication, except those specifically prohibited for student organizations. Students are required to adhere to the MCW corporate [Email Usage policy](#) as well as the MCW corporate [Mass Communications to MCW Student Populations policy](#).

Financial Aid

The Financial Aid Office administers MCW's financial aid programs and provides guidance and resources regarding debt management and financial literacy.

Students can visit the [Financial Aid Office website](#) to review the cost of attendance, access forms and important dates, and contact the Financial Aid Office directly.

MCW requires applicants to have earned a bachelor's degree or a minimum of 90 earned postsecondary credits to matriculate and be eligible for federal aid.

Exit Interviews

All students receiving federal loans must participate in mandatory entrance and exit counseling sessions. These sessions are a federal requirement as well as a condition of graduation.

Mandatory Credit Report Required Prior to Matriculation

All applicants who wish to matriculate to the MCW School of Medicine (except MSTP students), School of Pharmacy, or Master of Science in Anesthesia program must provide a copy of their credit report without adverse information to the Financial Aid Office by the published deadline. For more information, please refer to the [Credit Report Policy](#). International students complete different documentation. International students should refer to instructions provided by their MCW school representative.

Immunization Requirements

Students are required to comply with the Medical College of Wisconsin's [Mandatory Vaccination Program](#). Each academic program or school may have additional immunization requirements. Students are encouraged to consult the Immunization section of their respective school's student handbook.

Mobile Devices

The protection of an individual's privacy is one of the most important responsibilities of all faculty, staff, and students. The Medical College of Wisconsin instituted a corporate [Encryption for Electronic Protected Information policy](#) to help safeguard protected information that might exist on portable electronic devices such as tablets, smartphones, and laptops.

Nepotism

The Medical College of Wisconsin believes that the ability of its management, faculty, and staff to make objective decisions, and the ongoing trust needed for effective teaching, learning, and professional development in the academic, clinical, and research environments, may be compromised if there is or has been a personal non-professional relationship between individuals who have a reporting or evaluative relationship that could impair or could appear to impair an objective evaluation or have the potential to influence the educational status, grades, salary, faculty appointment, promotion, tenure, or other condition of employment ("Relationship"). The MCW corporate [Nepotism policy](#) applies to employees as well as students.

Smoke-Free Campus

To be consistent with the Medical College of Wisconsin's commitment to advancing health, all MCW buildings and grounds are smoke free and tobacco free. This is part of a larger Milwaukee Regional Medical Center campus initiative but extends geographically to include all facilities that MCW leases or owns off-campus as well. The MCW corporate [Smoke, Tobacco and Vape Free Campus policy](#) applies to employees as well as students.

Social Media

Social media may be used by the Medical College of Wisconsin for business-related purposes subject to the restrictions set forth in this policy. MCW recognizes that the use of social media can be a positive experience and supports the use when beneficial to advancing the missions of MCW; however, this policy is intended to ensure compliance with legal and regulatory requirements and privacy and confidentiality agreements. Social media includes such platforms as blogs, podcasts, discussion forums, and social networks.

For MCW students, social media may be used for curricular purposes subject to the restrictions set forth in the MCW corporate [Social Media policy](#). This policy applies to all students, faculty, and staff and prohibits the use of social media to unnecessarily introduce confidential topics and prohibits threatening or disparaging statements including sabotage. Students are advised to be mindful of their online presence and the potential for significant detrimental consequences of social media postings.

Title IX

Title IX of the Education Amendments of 1972 ("Title IX") is a Federal civil rights law that prohibits discrimination on the basis of sex—including pregnancy and parental status—in educational programs and activities.

The Medical College of Wisconsin is committed to creating and sustaining a safe learning and working environment that recognizes and values the dignity of all members of the MCW community. MCW prohibits discrimination on the basis of sex in all work, education and other programs, sexual harassment, domestic violence, dating violence, sexual assault, and stalking and extends to admission and employment. All MCW employees and students are encouraged to complete Title IX training. Everyone is required to adhere to the Title IX policies. Questions about the Title IX regulations may be referred to the MCW Title IX Coordinator, to the US Assistant Secretary of the Office of Civil Rights, or both.

Any person may report sex discrimination, including sexual harassment, pregnancy and parenting discrimination, in person, by mail, by telephone, email or any other method to the MCW Title IX Coordinator (or an Official with Authority as listed on the Title IX website) at any time by using the contact information listed below. MCW will provide supportive measures, and promptly follow the grievance process outlined in the MCW corporate Title IX policy after receiving a formal complaint treating both parties in an equitable manner. Anonymous reports can also be made by calling the student reporting hotline by phone (844) 703-8171 or via the online form. MCW encourages all individuals to report sexual misconduct to the Title IX Coordinator. Contact Information:

Katie Kassulke, MCW Title IX Coordinator

Mailing Address:

Medical College of Wisconsin, Office of Human Resources 8701 Watertown Plank Road

P.O. Box 26509 Milwaukee, WI 53226 *Office Address:*

Medical College of Wisconsin, Office of Human Resources Research Park Center, Suite 140

Telephone: (414) 955-8668 *Email:* TitleIXcoordinator@mcw.edu

Tuition & Fees

Students are responsible for paying tuition and fees by the due date specified. All students can view their accounts and make payments online in [MCWconnect](#). The deadlines for payment of 2023-2024 tuition and fees are as follows:

Medical College of Wisconsin Tuition Due Dates

Overall policy

Fall tuition is due at the end of the month in which classes start. An exception is granted when classes start within 10 days of the end of the month, in which case, fall tuition is due at the end of the following month.*

Spring tuition is due January 31.

	FALL		SPRING		SUMMER	
	TERM START DATE	DUE DATE	TERM START DATE	DUE DATE	TERM START DATE	DUE DATE
MED SCHOOL						
MKE						
1ST YEAR	7/10/2023	7/31/2023	1/8/2024	1/31/2024	-	-
2ND YEAR	8/14/2023	8/31/2023	1/2/2024	1/31/2024	-	-
3RD YEAR	6/26/2023	7/31/2023	1/8/2024	1/31/2024	-	-
4TH YEAR	6/26/2023	7/31/2023	1/8/2024	1/31/2024	-	-
CW						
1ST YEAR	7/10/2023	7/31/2023	1/8/2024	1/31/2024	-	-
2ND YEAR	6/26/2023	7/31/2023	1/2/2024	1/31/2024	-	-
3RD YEAR	6/26/2023	7/31/2023	1/2/2024	1/31/2024	-	-
4TH YEAR	6/26/2023	7/31/2023	1/2/2024	1/31/2024	-	-
GB						
1ST YEAR	7/10/2023	7/31/2023	1/8/2024	1/31/2024	-	-
2ND YEAR	6/26/2023	7/31/2023	1/2/2024	1/31/2024	-	-
3RD YEAR	6/26/2023	7/31/2023	1/2/2024	1/31/2024	-	-
4TH YEAR	6/26/2023	7/31/2023	1/2/2024	1/31/2024	-	-
GRAD						
18 Week	8/14/2023	9/29/2023	1/2/2024	1/31/2024	-	-
16 Week	8/28/2023	9/29/2023	1/15/2024	1/31/2024	-	-
MMP	8/14/2023	9/29/2023	1/2/2024	1/31/2024	-	-
9 Week	-	-	-	-	5/28/2024	6/28/2024
11 Week	-	-	-	-	5/13/2024	6/28/2024
MSA						
Class of 2026	8/28/2023	9/29/2023	1/2/2024	1/31/2024	-	-
Class of 2025	6/26/2023	7/31/2023	1/2/2024	1/31/2024	-	-
Class of 2024	6/26/2023	7/31/2023	-	-	-	-
PHARM						
Class of 2026	7/6/2023	7/31/2023	1/2/2024	1/31/2024	-	-
Class of 2025	7/5/2023	7/31/2023	1/2/2024	1/31/2024	-	-
Class of 2024	6/26/2023	7/31/2023	1/2/2024	1/31/2024	-	-

*Summer graduate school tuition will be due on 6/28 regardless of start date.

Graduate Students

Deadline for Students with Pending Student Loan Funds

For students with pending student loan funds in an amount equal to or greater than the total balance due, tuition and fees will be due upon notice of receipt of the funds, provided all required paperwork has been completed with the Financial Aid Office. Students may be withdrawn if loan applications are found to be incomplete. Students will have 10 days from the date of notice of receipt or until the tuition due date, whichever occurs last, to apply the loan funds to the tuition and fees due.

If the loan funds are not applied within the specified period, students may be withdrawn from courses. Any remaining balance that is greater than the amount of loan funds is due by the due date. If Title IV authorization is not provided before loan funds are received, any balance to which loan funds cannot be applied is due by the due date.

Deadline for Partial Term Charges

Students may be charged additional fees after the initial fee/tuition assessment for the current term. This may occur if there are insurance changes or laptop purchases throughout the year. The current term balance is due within five days of the change. Future term balances will be due on the deadlines indicated above.

Emergency Loan Program

MCW offers emergency loans to approved, full-time, and registered students in need of temporary funds. Students do not need to be aid recipients to qualify for an emergency loan.

Maximum Amount

Full-time students may apply for emergency loans by contacting the Office of Student Accounts. Between terms, continuing students do not need to be aid recipients to qualify for such loans, but they must be registered to apply for such loans. After an emergency loan has been repaid, students are not eligible for another such loan until a new term begins. A term is defined as July 1-December 31 and January 1-June 30 each academic year. The maximum amount that can be outstanding at any time under the Emergency Loan Program is \$2,000 per term.

Repayment

If students have applied for other loans through the Financial Aid Office, the emergency loan will come due within five days of the loan funds arriving or after 90 days, whichever is first. If the students have not applied for other loan funds, the loan will come due after 90 days. Emergency loans will be interest-free for the first 90 days, after which interest will accrue at the rate of 12% annually.

Any outstanding emergency loans must be paid back upon leave/withdrawal. Students will not be allowed to register for a new academic year until their loan and accrued interest are repaid.

Students who become delinquent on an emergency loan will have a hold placed on their account. If they have not yet done so, they will not be able to register for the next academic term until the loan and accrued interest are paid. All outstanding emergency loans due to MCW must be paid for students to receive their diploma.

Late Fees and Non-Payment of Tuition

There is a \$250 Late Payment Fee for tuition not paid by the due date. If tuition and fees, plus any applicable delinquency charges, are not paid in full by the tuition due date, non-paying students may be withdrawn from courses.

Payment Options

Student payments may be made via MCWconnect by transfer from a bank or money market account, by cash or check placed in the drop box in the main lobby of MCW, or mailed to:

Medical College of Wisconsin

Attn: Controller's Office – Office of Student Accounts 8701 Watertown Plank Road

Milwaukee, WI 53226

Checks should be made payable to the Medical College of Wisconsin and must be received by the due date, or a late payment fee may apply.

Refunds

If students withdraw or are dismissed, tuition will be refunded based upon the amount of tuition due less the percentage of days enrolled, up until the time Federal Regulations determine tuition has been fully earned via the Return of Title IV process (R2T4). With the exception of health, dental, vision, and life/disability insurance, all fees are non-refundable. After the R2T4 process determines tuition has been fully earned, no refund will be issued. Insurance is refunded based on the number of months the student is enrolled in coverage regardless of the R2T4 determination.

If refunds are due to students who received financial aid during the current payment period, the amount of the refunds will normally be returned to the financial aid program(s) first according to Federal Regulations. Students who received institutional scholarships will retain, for past and current terms only, the disbursed scholarships upon dismissal or temporary or permanent withdrawal. In the event an overpayment still exists, any remaining funds will be refunded.

Recording Devices

Audio or visual recording by students of lectures for personal use is permitted, but may not be reproduced, shared, or distributed to others or posted on any public forum. These recordings may include proprietary information and should be destroyed at the end of enrollment at the Medical College of Wisconsin. Students are encouraged to review specific course policies on class syllabi. Students will be given access to course materials for courses they are actively involved in or have successfully completed.

Violence Prevention

Students are required to abide by the Medical College of Wisconsin's corporate [Workplace Violence Prevention policy](#), which includes restrictions regarding firearms and other dangerous weapons.

School of Graduate Studies

4+1 Dual Degree Program Degree Offered: Master of Public Health

Program Description

This program allows undergraduate students at partner schools to pursue graduate coursework online. Up to 15 credits of this graduate work may count towards both the undergraduate and graduate degrees. After earning the undergraduate degree, students continue as graduate students at MCW for approximately one additional year until they complete the Master of Public Health program. The curriculum focuses on public health practice and consists of four core courses, seven additional required courses, one elective course, a field placement experience, and a capstone project. Assignments require the application of theoretical concepts to practical situations through case analysis and experiential activities.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has specific requirements as defined by the undergraduate institution and MCW.

Credits Required to Graduate 42 credits

Program Credit Requirements

18101 Foundations of Public Health. *3 credits.*

This is a required course for all students enrolled in the MCW MPH dual degree program and is offered as an elective to all other currently admitted MPH students. This course provides an overview of various theories and practices in public health, as well as how public health theories and practices can be applied to the health of populations. Using the public health system as a framework, the course will address core foundational aspects of public health, public health history, 21st century public health practices, the interrelationship between law, government, and public health, and an introduction to public health emergency preparedness and response. The course will also address health determinants and health equity in the practice of public health.

18155 Public Health Theory & Practice. *3 credits.*

This course provides an overview of various theories in public health, as well as, how public health theories can be applied in individual, interpersonal, and community settings. The course will highlight various factors that contribute to public health, including biological, family, ethnic and cultural, and community stressors that affect health and well-being. The course will provide an overview of translating research into public health practice.

18160 Racial and Ethnic Inequalities in Health. *3 credits.*

Recommended: General Epidemiology and Basic Biostatistics.

This course will provide students with an in-depth introduction to health disparities and health

inequities as they pertain to specific populations in the US that have been historically disadvantaged and systematically deprived of opportunities to achieve optimal health. The course material will also include an overview of social determinants of population health. We will: (i) consider historical and contemporary debates in conceptualizing race and ethnicity, (ii) examine the burden of racial and ethnic disparities in the US, (iii) identify and examine some of the social determinants of health of health and drivers of health inequity and (iv) examine theoretical and practical challenges of developing innovative strategies to eliminate health disparities and achieve health equity.

18165 Principles of Public Health Data and Epidemiology. *3 credits.*

This course examines public health data and epidemiological concepts, including foundations of epidemiology, practical applications of public health data and epidemiology, core measures in public health, descriptive epidemiology, sources of data, study designs and data analysis, communicating data, informatics, disease transmission and prevention, morbidity and mortality, screening tests, infectious disease causation, environmental health, and social, behavioral, and psychosocial epidemiology. The course emphasizes practical application of concepts and skills learned related to accessing, analyzing, and communicating public health data. The course provides the student with an understanding of the distribution and determinants of health and disease in population groups. The course provides the foundation for many other courses in the MPH program.

18203 Public Health Administration. *3 credits.*

Public health professionals require administrative skills at many levels, from managing personnel and health programs, to making and advocating for organizational and policy decisions regarding the distribution of society's scarce public health resources. This is a survey course designed to introduce 1) the structure, functions, and financing of public health within the context of the U.S. healthcare system and its health policies; 2) the planning, implementation, management, and evaluation of programs to improve health; and 3) principles of effective finance, budgeting, grant-writing, and management strategies. In addition to tutorials, readings and case studies, students will complete assignments that are aligned with their own communities, organizations, and professional roles.

18204 Public Health Analytics. *3 credits.*

The use of descriptive and analytical statistics in research studies, with an emphasis on understanding statistical reports and judging the appropriateness of statistical applications reported in the literature. Calculations of statistics are included as a means to understand the appropriate use of statistics.

18209 Community Health Assessment and Improvement. *3 credits.*

Recommended: 18203 Public Health Administration

This course covers the central concepts of community health assessment and improvement.

Students will review public health concepts from a public health systems and practice perspective. The course will focus on public health essential services 1 and 2. Students will obtain an understanding of the public health system, community health assessment and the health improvement process using selected frameworks. The course will focus in-depth on learning about the Mobilizing for Action through Planning and Partnerships (MAPP) frameworks and application of selected components to course projects. In addition, this course will provide the foundation for future community health planning and evaluation courses by building on the content of the public health administration course using a public health practice perspective.

18223 Public Health Policy. *3 credits.*

This course will meet the need of MCW MPH students to know and understand the fundamentals of public health policymaking by diverse stakeholders in the process. The course fills gaps in the curricula at MCW. The textbook is Bodenheimer and Grumbach, *Understanding Health Policy: a Clinical Approach*, 6th edition, Lange publisher. Each session has educational objectives and a competency goal, readings and possible videos, a recorded audio slide presentation by faculty, and a discussion question for students addressing the conflicts and challenges in policy development.

18230 Community Health Program Planning. *3 credits.*

Recommended: 18203 Public Health Administration and 18209 Community Health Assessment and Improvement.

Builds on the foundation in health improvement program planning obtained in the Public Health Administration and Community Assessment and Improvement courses. This course will increase the depth and breadth of students' knowledge and skills through a theoretical and application-based curriculum through three modules, including strategic planning, program planning, and leadership competencies to lead planning efforts.

18260 Community Health Program Evaluation. *3 credits.*

The Community Health Program Evaluation course examines the basic topics related to Community Health Program Evaluation including the history of program evaluation; the levels of program evaluation process; qualitative and quantitative measures; data management tools; data analysis methods; quality management; and other contextual issues surrounding program evaluation. This course will incorporate the use of assigned readings, group projects, peer evaluation, online discussions, and exams in order to foster knowledge of material presented in the course, as well as application-based learning in the area of evaluation of community health.

18268 Leadership for the Public's Health. 3 credits.

Prerequisites: 18203 Public Health Administration. For students with limited public health experience, 18209 Community Health Assessment and Improvement is recommended as a prerequisite.

The course takes a broad look at leadership within public health practice. An introduction to theoretical and evidence-based research is applied to a wide range of public health challenges. Learners will apply knowledge and personal experiences to newly focused leadership understanding through application to practice. Leadership theory and research will connect to core public health practices of assessment, policy development and assurance.

18279 Field Placement Preparation. 1 credit.

Prerequisites: 18165 Principles of Public Health Data and Epidemiology, 18203 Public Health Administration, 18204 Public Health Analytics, 18155 Public Health Theory and Practice; all required coursework in the Master of Public Health program besides 18280 Field Placement and 18297 MPH Capstone Project recommended.

This course provides the foundation for the MPH Field Placement course, a required culminating experience within the MPH program. In the Preparation course, students will connect with public health organizations and arrange their specific Field Placement project. The course will highlight principles of human subject research as well as community academic partnerships and will help students apply these principles in the development of their project.

18280 Field Placement. 1-5 credits.

Prerequisites: All required coursework in the Master of Public Health program besides 18297 MPH Capstone Project recommended.

This is a planned, supervised and evaluated applied practice experience that is designed to enhance and complement the student's educational training by providing practical experience in public or private organizations that address significant public health issues. Working with a site preceptor and faculty advisor, students will develop at least two products for an organization that demonstrate public health competency attainment and are relevant to their professional area of interest.

18297 Capstone Project. 3 credits.

Prerequisites: All other MPH coursework.

The Capstone Project or Integrative Learning Experience is a culminating experience that requires the students to synthesize and integrate knowledge acquired in coursework and other learning experiences and apply theory and public health principles in the development of a master's paper on significant public or community health issue or topic.

Elective Courses

18115 Health Promotion and Disease Prevention. *3 credits.*

Students will learn key concepts through readings, lectures, on-line discussions and written exercises. The latter will allow students to practice designing elements of an HP/DP plan for a population and health problem of their own choosing using each of the theoretical models and techniques presented in the course. This course is an elective in the MPH degree program, the Certificate in Community Health Assessment & Planning program, and the Certificate in Population Health Management program.

18215 Infectious Diseases. *3 credits.*

Emphasizes the practice of public health in the following areas of infectious diseases: surveillance, outbreak investigation and control, and prevention and policy.

18150 Public Health Law and Ethics. *3 credits.*

The Public Health Law & Ethics course examines law as a tool for public health as well as the ethics underlying the practice of public health and how they interact with the ethical principle of justice, which underlies all of law. The course explores law and ethics in public health through readings related to governmental authority with respect to population and the conflict that it can create with individuals' rights. The course focuses on inadequacies of and changes to the law as revealed by the COVID-19 pandemic and the need to realign public health and the law with the ethics of health justice and equity.

18232 Introduction to Population Health Management. *3 credits.*

Provides knowledge and builds competencies to improve population health outcomes as well as patient and provider experiences and to reduce per person costs; themes include leadership in teams, care of populations, health service quality and value, data analysis and reporting, and financial management; competencies include leadership and interprofessional communication, systems thinking, social and behavioral sciences, data management, process and outcome improvement, and policy advocacy.

Biochemistry, Doctor of Philosophy

Program Description

As a member of the Biochemistry PhD program at MCW you will have the opportunity to investigate the mechanistic basis of diseases including cancer, neurodegeneration, heart failure, diabetes and others using state-of-the-art facilities and instrumentation for structural biology, metabolism, signal transduction and drug discovery.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Admission to the Biochemistry Graduate Program is through the [Interdisciplinary Program in Biomedical Sciences \(IDP\)](#), [Neuroscience Doctoral Program \(NDP\)](#), or [Medical Scientist Training Program \(MSTP\)](#). After completion of the first-year curriculum of that program, students who choose to complete their dissertation research project with faculty of the Biochemistry Department will have the opportunity to continue their graduate studies by selecting from among a wide range of courses that are offered within the Biochemistry Department as well as other programs at MCW. Courses to be taken are based on the student's interests in consultation with the student's dissertation committee.

Fields of Study

The following areas of research are available in the department:

The identification and characterization of signaling pathways that prevent cells from completing cytokinesis with unresolved mitotic errors.

- Structure/function studies of kinases and other proteins that ensure faithful progression through cytokinesis.
- Machine learning to predict and understand biology, enabling drug discovery and personalized medicine
- Mass spectrometry-based multi-omics (proteomics, metabolomics, lipidomics)
- Cancer cell signaling in neurological and other malignancies.
- Regulation of chromatin structure and accessibility by the conformation and dynamics of nucleosomal histone tails. Additional levels of regulation by histone post-translational modifications (PTMs) and histone variants.
- Post-translational modification of lysine and cysteine residues controls protein function and exploiting these insights in the design of novel chemical probes
- Functional study of the nutrient-dependent O-GlcNAc signaling in pregnancy, early development, and metabolism.
- Pre- and Post-natal exposure to non-nutritive sweeteners: impact on development and metabolism
- Heme protein interactions with the actin cytoskeleton, mitochondria and RNA regulating proteins, how these change with cellular environment and the downstream effects.
- Redox and calcium signaling in the heart and disruptions contributing to atrial fibrillation.
- Diabetes, beta cell biology, inflammation innate immunity, cell signaling, cell fate decisions.
- Molecular mechanisms underlying the functioning of mannose 6-phosphate receptors (MPRs) in mammalian cells.
- Molecular regulation of nutrient utilization in metabolic syndrome, atherosclerosis and inherited diseases of fat metabolism.
- Molecular mechanisms governing G protein-coupled receptor signaling in mammalian cells.
- Structural biochemistry of multi-protein machinery (RNA polymerases and associated factors) involved in gene transcription and RNA processing in the eukaryote.
- Oxidative stress, reactive oxygen/nitrogen species, cell membrane lipids, lipid peroxidation and mechanisms of oxidative apoptosis.

- The role of metabolic modifications such as acetylation. The role of topological stress in DNA. The role of accessory proteins in modulating histone DNA interactions.
- Structure-function relationship of enzymes and receptors using X-ray diffraction methods.
- Characterization of molecular mechanisms of protein dynamics and protein-protein interactions using solution NMR and other biophysical techniques.
- In vivo mechanisms controlling developmental and cardiovascular specific gene expression.
- Druggability of proteins involved in mitochondrial homeostasis in healthy and diseased cells to identify molecular mechanism and novel therapeutic routes.
- Mechanistic differences of Ras/Raf-induced growth inhibition vs. proliferation at molecular levels.
- Protease and protease inhibitors in the cornea. Structure-function of maspin and its effects on carcinoma and corneal cells.
- Structural biology of immunological signaling molecules and the use of NMR spectroscopy in structural proteomics.

Credits Required to Graduate 60 credits minimum

Required Courses

10222 Ethics and Integrity in Science. *1 credit.*

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered during the spring and summer terms only.

10444 Research Ethics Discussion Series. *1 credit.*

Prerequisite: 10222 Ethics and Integrity in Science.

The course is directed by members of the Bioethics Faculty and provides facilitated discussions of a series of topics in research ethics. Discussions are led by members of the Basic Science faculty and are focused on ethical issues that commonly come up in biomedical research. The course is meant to not only reinforce the basic ethics taught in the online course Ethics and Integrity in Science, which is a prerequisite, but also to explore the gray areas of the individual topics. The intent is to offer students illustrative examples of ethical issues that might arise in their careers, to emphasize the ethical principles that apply in such situations, and to provide practical guidance on how these types of situations should be correctly handled. This course is offered as a discussion series. Students are expected to attend and participate in the discussion. Bioethics 10444 is offered during the spring terms only.

02207 Enzyme Kinetics and Receptor Binding. *1 credit.*

This course teaches both the theoretical framework and practical aspects of enzyme kinetics and receptor binding studies. Topics covered include basic steady state kinetics including the determination and meaning of K_m and V_{max} values for simple and multisubstrate reactions, determination binding properties and kinetic consequences of common reversible inhibitors (competitive, non-competitive, uncompetitive, mixed), slow-on, slow-off inhibitors and irreversible inactivators. Dissociation constants and procedures for determining them will be discussed for both enzymes and macromolecular receptors. Practical methodologies for determining pre-steady state kinetics will be presented. Practical aspects of designing kinetic studies will be discussed and later sessions of the course will involve reading and student-led discussions of studies in the literature that illustrate ways in which studies of enzyme kinetics or receptor binding advanced the study of particular enzymes and other macromolecules. Over the six-week duration of the course each student will prepare a short report in which he or she describes the design and, if possible, execution of a series of kinetic or receptor binding studies that draw on the teachings of the course and are related to the work each proposes to carry out for a dissertation.

02226 Biophysical Techniques in Biochemistry. *3 credits.*

Prerequisite: 16268 Protein Chemistry: Principles

This course will introduce the basic theory and practical applications of an array of biophysical techniques commonly used in biochemical research. Optical, fluorescence, and magnetic resonance spectroscopies, x-ray crystallography, mass spectrometry and kinetics techniques are just a sampling of the topics covered in this comprehensive course.

02230 Biomolecular NMR: Structure and Molecular Recognition. *1 credit.*

Prerequisite: 16268 Protein Chemistry: Principles

Nuclear magnetic resonance spectroscopy (NMR) is a powerful tool for the interrogation of biomolecular structure and interactions at atomic resolution. Structural genomics efforts have produced refinements in the methodology for three-dimensional protein structure determination, such that new structures can be solved in a matter of weeks using increasingly automated processes. This course begins with a description of the quantum mechanical basis for multidimensional NMR using the product operator formalism. This powerful operator algebra rigorously predicts the propagation of the nuclear spin wavefunction under a time independent

Hamiltonian operator governing interactions between nuclear spins and between spins and static or transient magnetic fields, enabling the development of increasingly complex pulse sequences for multidimensional, multinuclear NMR measurements of biomolecules. Simple pulse sequences for magnetization transfer and isotope editing are described using product operators and combined into more complex two- and three dimensional pulse schemes for triple-resonance correlation of nuclei in proteins. Systematic application of these NMR methods to the sequence-specific assignment of isotopically enriched proteins will then be linked to the interpretation of other of types of NMR data (nuclear Overhauser effect; scalar and dipolar couplings) that report directly on tertiary structure.

The balance of the course will consist of practical, hands-on training in basics of 2D/3D NMR data acquisition, processing, and analysis, as well as interactive computer tutorials on the chemical shift assignment and 3-D structure determination processes.

02235 Biomolecular NMR: Protein Dynamics and Binding. *1 credit.*

Prerequisites: 16268 Protein Chemistry: Principles

and enrollment in 02230 Biomolecular NMR: Structure and Molecular Recognition.

NMR spectroscopy is one of the most powerful tools of contemporary structural biology. Multiple NMR applications enable structural, thermodynamic, and kinetic analysis of proteins and nucleic acids under physiological conditions with site-specific resolution. The course "Biomolecular NMR: Protein Dynamics and Binding" discusses applications of NMR to protein dynamics, conformational transitions, and ligand binding. The topics include NMR line shape analysis and spin relaxation methods that are used to extract structural, thermodynamic, and kinetic parameters of conformational transitions and ligand binding in proteins. The course is directed to students who would like to utilize NMR spectroscopy as a part of the dissertation research.

02240 Contemporary X-ray Crystallography. *1 credit.*

Prerequisite: Completion of IDP course curriculum.

X-ray crystallography is the main method that is used to elucidate three-dimensional structures of macromolecules and biomolecular complexes, and capable of revealing structural details at high resolutions. Powered by modern synchrotron-based light sources and state-of-the-art computer programs, contemporary crystallographic research has provided mechanistic insights into complex cellular functions such as gene transcription and translation. While crystallographic computer programs are openly available, the use of these packages by biologists who do not have a theoretical comprehension of crystallography can be unproductive. This course is designed to teach non-crystallographers the capability to intelligently use crystallographic programs that are available in the form of bundled software. Attendees will learn systematically the central theory behind the crystallographic tools in use today, and hence grow an appreciation of the physical process that takes place during an experiment to determine the structure of a protein or nucleic acid. A central aim of this is to generate stimulating discussions that will help the students grasp the essence of macromolecular crystallography.

02248 Structural Basis - Macromolecules. *1 credit.*

With the explosion of the number of three-dimensional structures of biological macromolecules that have been determined, it is imperative to learn how to study their structures in detail and learn the molecular basis for their functions. This course discusses the mechanism of action and the relationship between structure and function of selected groups of biological macromolecules. The molecules studied range from enzymes (both soluble and membrane-bound) to proteins involved in signal transduction and in epigenetic gene regulation. At the end of the course, the student will attain the skills to analyze the relationship between structures and functions of proteins.

02276 Special Topics in Biochemistry. *1 credit.*

Students are expected to develop an advanced understanding of various aspects of special topics in biochemistry through introductory lectures, outside readings, and in-class discussions.

02295 Reading and Research. *1-9 credits.*

The course of study for Reading and Research is designed by each student with his/her advisor to focus on readings in literature in the student's field, to build bibliographic resources for the dissertation, and to conduct supervised, independent research.

02301 Seminar. *1 credit.*

Students are given practice in presenting and evaluating their research data. Solutions to research problems encountered are also discussed. Seminar is required beginning in the second semester and continues throughout each student's program.

02399 Doctoral Dissertation. *9 credits.*

This course is required for the completion of the PhD degree. The PhD candidate must submit a dissertation based on original research of a high scholarly standard that makes a significant contribution to knowledge in their chosen field.

16267 Protein Chemistry: Applications. *1 credit.*

Protein Chemistry: Applications is a course suitable for all students interested in developing critical thinking skills through literature examples of protein activity and its regulation. Students and instructors will discuss literature that illustrates the in vitro reconstitutions, proteins structure/activity, and methods and logic of experimental design including critical control experiments. In addition, the discussions will include methods learned in the first-year curriculum that might have been applied but were not. From these analyses, students will hone their critical thinking and communication skills. Grading for this course will be based on 100 total points: 48 pts for classroom participation (metric attached) and 52 pts for a student directed presentations/discussions (metric attached). At least three instructors will be involved in the grading of final presentations and the final score to be an average of each instructor's total score. The course will be capped at a maximum of 12 students; a minimum of 4 students will be required to offer this course. Instructors for this course will include current faculty members participating in the Biochemistry Graduate Program. The course will be offered every Spring semester. An overarching goal of the course is to prepare students for understanding the methods and logic underlying experimental design in modern biomedical research.

16268 Protein Chemistry: Principles. *1 credit.*

Protein Chemistry: Principles is a course suitable for all students interested in developing critical thinking skills through literature examples of protein activity and its regulation. In this course, students and instructors will use the primary literature to learn and apply the practical formalisms in protein chemistry – including thermodynamics, kinetics, enzymology, and chemical biology – to the regulation of protein activity. Biology is governed by thermodynamic and kinetic principles, but these principles are often abstract to students. The purpose of this course is for students to develop utility in thermodynamic and kinetic principles and apply them to biological systems. The course will emphasize literature examples and expect students to learn these principles by working through problem sets provided by instructors. Students will be able to differentiate when thermodynamics or kinetics likely govern a given biological system and have a framework by which to analyze new systems. In addition, classroom discussions will include alternative methods and their relative merits. From these analyses, students will hone their critical thinking and communication skills. Grading for this course will be based on 225 total points: 90 pts for one in-class 90 min exam (90 pts, 10pts/lecture, 40% of grade), 90 pts for a student-directed presentations/discussions (metric attached, 40% of grade), and 45 pts on overall student participation in instructor-led discussion sessions (metric attached, 20% of grade). The course will be capped at a maximum of 12 students; a minimum of 4 students will be required to offer this course. Instructors for this course will include current faculty members participating in the Biochemistry Graduate Program. The course will be offered every Spring semester. An overarching goal of the course is to prepare students for understanding the methods and logic underlying experimental design in modern biomedical research.

16274 Metabolism. *1 credit.*

This new elective course will be mainly a didactic based course that will comprehensively review subjective important to metabolism. the topics covered will range from carbohydrate metabolism to oxidative phosphorylation to lipid and amino acid metabolism. There will be a strong focus of these topics in health and disease, especially as they related to the cardiovascular system, cancer, diabetes, and immune system function. The depth of coverage within each topic will not necessarily be comprehensive, but there may be a few aspects of each topic that will be highlighted by focusing on landmark studies or recent developments from published research articles. Although there will be a specifically assigned textbook, students will be encouraged to read relevant chapters from Fundamentals of Biochemistry (Voet). Professors will also have the option to provide a specific reading list from either the Fundamentals Textbook, original scientific papers and/or review articles required for reading.

Required Courses as Needed

02002 Master's Thesis Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

02003 Doctoral Dissertation Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including dissertation credits but have not yet completed the writing of the Dissertation. Continuation status is limited to three consecutive terms following the completion of Dissertation credits.

02299 Master's Thesis. *6-9 credits.*

Students in the Ph.D. degree program who cannot or elect not to complete that program may be allowed to transfer to the Master's program. This transfer must be approved by the student's advisor, the Program Director, the Chair, and the Graduate School. To transfer to the Master's Program, the student must be in good academic standing according to regulations established by the Graduate School.

Bioethics, Master of Arts

Program Description

The Master of Arts in Bioethics Program provides advanced training in bioethics for professional, academics, and other interested individuals in health care, law, the humanities, and public policy who wish to become prepared for teaching, research, policy development, and/or clinical work in the field of bioethics. The program curriculum consists of a robust combination of theoretical and clinical course offerings that provide a strong foundational knowledge base upon which students develop the skills and understanding necessary to analyze and address the difficult and evolving ethical issues encountered in health care today.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has no additional specific requirements; however, interested individuals from all disciplines and backgrounds with a commitment to the field of bioethics are encouraged to apply.

Credits Required to Graduate 30 credits

Program Credit Requirements

10209 Clinical Topics in Bioethics. *3 credits.*

This course will provide an overview of the major areas of clinical bioethics. These are the topics that clinical ethicists commonly wrestle with in their role as consultation leaders, ethics committee members and teachers of contemporary bioethics. These have not yet been resolved to everyone's satisfaction. Students will examine informed consent, decision making, the role of advance directives, treatment limitations and appropriate end of life care. Further, students will look at the role of both physician and nurse in these dilemmas as well as the role of the ethics committee. Finally, students will tackle some more global issues that are still within the clinical arena--such as epidemiology and the concerns with emergency preparedness, institutional ethics and, and research ethics.

10210 Philosophical Bioethics. *3 credits.*

In this course, students will explore the foundations of philosophical ethics in the West, and how early themes shape current work in philosophical bioethics. To this end, students will read works by Aristotle, Kant, and Mill, focusing on their theoretical approaches to ethics. Detailed discussion will focus on the ethics theories known as virtue theory, casuistry, deontology, utilitarianism, communitarianism, and principlism, considering both their historical origins and modern interpretations. Students will apply these theories to topical themes of moral development, abortion, assisted death and others, noting their strengths and weaknesses.

10223 Law and Bioethics. *3 credits.*

This course provides an introduction to legal principles and legal precedent relevant to issues in bioethics, aimed at providing the foundation for understanding relevant law concerning these issues.

Required Courses as Needed

10002 Master's Thesis Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

10231 Bioethics Consulting and Committees. *1 credit.*

Through attendance of ethics committee meetings and ethics consultations, this course will familiarize students with both the theoretical and practical aspects of institutional and consultative ethics. This course is required for students with no professional experience in clinical bioethics.

Elective Courses

10200 Clinical Bioethics I. *3 credits.*

This course provides an introduction to medical ethics in the clinical setting. It consists of daily rounds with various medical or surgical teams in selected hospital treatment areas, plus a weekly session to discuss and analyze issues encountered. Enrollment limited.

10203 Justice and Healthcare. *3 credits.*

This course will provide an overview of Justice and Health Care. We will begin with a close look at a number of philosophical perspectives on distributive justice, including John Rawls' Theory of Justice, Utilitarianism, Equality of Opportunity, various theories of Equality, and the concept of Triage. Students will then apply these perspectives to issues in access to healthcare/health insurance coverage, genetic enhancement, and the distribution of risks and benefits of medical research. The second part of the course will focus on the effects of managed care on contemporary medical practice in the US. In particular, students will examine how managed care arrangements alter the physician-patient relationship, the factors which have led to the development of managed care reimbursement systems, state and federal health care plans, and in particular the Oregon Plan.

10205 Introduction to Hospital Medicine. *3 credits.*

This course provides an introduction to human pathophysiology and the functioning of a contemporary medical center. It consists of discussions of human pathophysiology and discussions with hospital professionals about their role in patient care.

10206 Ethics and the Law. *3 credits.*

This course explores the legal and ethical issues impacting physician conduct, regulation, and professionalism. The course will provide a general overview of the various factors that influence physician conduct and regulation, such as codes of ethics, licensing requirements, the court system, and ethics mechanisms such as ethics committee and institutional review boards.

10207 Introduction to Research Ethics. *3 credits.*

This course provides students with a comprehensive introduction to the ethical issues involved in scientific, animal and human subjects' research. After a brief look back at the history of research ethics, students will spend time considering issues that impact research in both the laboratory setting and in the clinical setting. This course provides the necessary research ethics instruction required to satisfy the United States Public Health Service Policy on Instruction in the Responsible Conduct of Research for institutions receiving research funds from the Department of Health and Human Services. (Issued December 1, 2000).

10211 Ethics Beyond the Acute Care Hospital. *3 credits.*

This course examines ethical issues in rehabilitation care, psychiatric care, hospice, long-term care, dental care, and other settings. The focus is on developing a framework and language in which to discuss and analyze moral problems in these settings. Care settings to be covered may vary.

10216 Race and Trust in Biomedical Research. *3 credits.*

Using the ethical principle of social justice, this course will provide an overview of society's role in promoting or ensuring individual and collective health through biomedical research. The course will examine how attitudes toward race and difference have impacted protections of basic human rights in biomedical research, document past and present abuses in biomedical research, and examine how lack of trust stemming from past abuses impacts the ability to attain, maintain, and promote well-being through biomedical research.

10220 Critical Approaches to Bioethics. *3 credits.*

Various alternative approaches in ethics and biomedical ethics will be explored in order to provide a broad understanding of the range of critical social and philosophical thought on biomedical issues.

10222 Ethics and Integrity in Science. *1 credit.*

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered in the spring and summer terms only.

10225 Religion and Bioethics. *3 credits.*

This course will examine the diverse range of religious resources that are pertinent to the field of bioethics. Students will explore topics in bioethics, such as euthanasia, abortion, and informed consent from the perspectives of various religious traditions.

10226 Regulatory Issues in Human Subjects Research Protections. *3 credits.*

There is no question that the fruits of research have fueled medical progress. Yet, the history of research involving human subjects is not unblemished. Federal regulations, based on ethical principles set forth in the Belmont Report, now govern much of the research undertaken in the United States. In this course, we will explore the history and substance of research regulations in the United States, the application of the regulations to specific research issues, and situations where the regulations do not provide clear guidance.

10228 Current Topics in Research Ethics. *3 credits.*

Rapidly evolving scientific and technologic capabilities in medicine combined with an ever increasing demand to translate these scientific developments to the bedside presents new challenges to regulating human subjects' research. This course seeks to keep pace with many of these new and emerging challenges, providing students an opportunity to critically examine the ethical and legal implications of these topics. Specific topics for analysis will be drawn from the current medical literature, popular press, and evolving policy guidance.

10231 Bioethics Consulting and Committees. *1 credit.*

Through attendance of ethics committee meetings and ethics consultations, this course will familiarize students with both the theoretical and practical aspects of institutional and consultative ethics. This course is required for students with no professional experience in clinical bioethics.

10233 Issues in Pediatric Ethics. *3 credits.*

This course will discuss the question of children's rights, the social value of children and cross cultural issues of childhood. The objective of the course is to examine our individual assumptions about childhood and parenting that form the basis of approaches to pediatric ethics.

10234 Ethics and Human Reproduction. *3 credits.*

This course will provide an opportunity for students to explore some of the ethical issues related to human reproduction, including assisted reproductive technologies, genetics, and cloning. Students will also examine the various religious and philosophical arguments, as well as international perspectives, surrounding issues of human reproduction.

10275 Special Topics in Bioethics. *3 credits.*

This course focuses on topics of special interest in bioethics. Examples of topics include neuroethics, ethics at the end of life, ethical issues in mental health, and political issues in bioethics and public health.

10295 Reading and Research. *1-3 credits.*

This independent study course is available to all Master's degree-seeking students, and awards credit for pursuing background reading and new research in areas of particular student interest.

10297 Master's Consultation. *1-2 credits.*

This course will familiarize and train students in the theoretical and practical aspects of ethics consultation through a seminar, supervised practical experience in doing ethics consultations, and writing summaries and reporting these consultations at monthly ethics committee meetings.

10298 Journal Club. *1 credit.*

This journal club is a student and faculty forum for the discussion of a variety of contemporary issues in bioethics. Its informal setting allows for open discussion on wide-ranging topics.

10299 Master's Thesis. *3-6 credits.*

Students may choose to undertake and complete research culminating in a master's thesis. Both scholarly and quantitative research are acceptable. This research is directed by a member of the Bioethics faculty.

10444 Research Ethics Discussion Series. *1 credit.*

Prerequisite: 10222 Ethics and Integrity in Science.

The course is directed by members of the Bioethics Faculty and provides facilitated discussions of a series of topics in research ethics. Discussions are led by members of the Basic Science faculty and are focused on ethical issues that commonly come up in biomedical research. The course is meant to not only reinforce the basic ethics taught in the online course Ethics and Integrity in Science, which is a prerequisite, but also to explore the gray areas of the individual topics. The intent is to offer students illustrative examples of ethical issues that might arise in their careers, to emphasize the ethical principles that apply in such situations, and to provide practical guidance on how these types of situations should be correctly handled. This course is offered as a discussion series. Students are expected to attend and participate in the discussion. Bioethics 10444 is offered in the spring term only.

Bioinformatics, Master of Science

In partnership with Marquette University

Program Description

This interdisciplinary program is jointly offered by Marquette University and Medical College of Wisconsin. The program prepares students for a multidisciplinary career in the biomedical sciences using mathematics, statistics, and computer science. It is designed to provide students quantitative tools for analyzing data and problems associated with molecular, cellular, physiological, and particularly, genetic systems. Students may select courses from a list of approved courses offered by the following departments at Marquette: Computer Science; Mathematical and Statistical Sciences; Biology; Biomedical Engineering; and Electrical and Computer Engineering. In addition, courses are offered by the Department of Physiology and the Division of Biostatistics at Medical College of Wisconsin. The program meets the needs of recent undergraduates seeking an advanced degree as well as employed professionals interested in opportunities for career advancement. Students are admitted under the non-thesis option, but a thesis option is also offered. Students may pursue the degree on a full-time or part-time basis. Many courses are offered evenings.

Learn more [here](#).

Biomedical Engineering, Doctor of Philosophy

In partnership with Marquette University

Program Description

Biomedical Engineering (BME) is an interdisciplinary field that is based on the application of engineering principles and experimental and analytical techniques to the development of biologics, materials, devices, implants, processes, and systems that advance biology and medicine and improve medical practice and health care.

The Doctor of Philosophy (PhD) degree in BME is a research degree that is intended to provide the graduate with the breadth and depth of knowledge in one area of specialization within BME, as well as the scientific research training needed for successful careers in academia, biomedical industry, or government. The research training process begins with the student working closely with his or her Dissertation Director and participating in his or her research program. Building on these experiences, the student begins to conduct independent research that eventually leads to an original contribution to the BME field.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Graduates of accredited colleges or universities with a Bachelor's or Master's degree in various engineering, physical science, or life science disciplines or equivalent are eligible for admission to the joint MU-MCW PhD Program in BME.

Students who do not have a BME degree are admitted into the PhD program on a conditional status based on successful completion (grade of B or better) of a sequence of leveling courses. These courses will provide them with fundamental engineering principles and analytical skills needed for successful completion of the PhD degree in BME. See the [Handbook of MU-MCW PhD Program in BME](#) for details.

Credits Required to Graduate 60 credits minimum

Program Credit Requirements

Upon enrolling in the doctoral program in BME, a student selects his or her area of specialization. Faculty designs a curriculum and research program to address the specific goals of each student. Program includes course work in engineering, biology, mathematics, and medicine, all of which are integrated with research laboratory experience.

The Doctoral Qualifying Examination (DQE) consist of both written and oral components. Students entering the doctoral program with a master's degree are recommended to take the DQE at or before the completion of 15 graduate credits of didactic coursework. Students entering the doctoral program with a bachelor's degree are recommended to take the DQE at or before completion of 30 graduate credits of didactic coursework. The written portion of the DQE involves writing a dissertation proposal in the form of an NIH-style F30/F31 fellowship grant proposal and the oral portion involves presentation and defense of the dissertation proposal, in which the Dissertation Committee members serve as examiners.

A minimum of 60 graduate credits are required to complete the PhD degree in BME. For someone entering with a BS degree, this constitutes 36 credits in didactic coursework, 9 credits in dissertation, and a minimum of 15 credits in reading and research. For those entering with an MS degree or with 18 graduate credits (see Transfer of Credits Policy), they are required to complete a minimum of 18 credits in didactic coursework, 9 credits in dissertation, and a minimum of 33 credits in reading and research. Pre-requisite courses for applicants who do not have a BME degree are not counted as graduate credits. Reading and research credits can be earned by registering and attending a seminar series, workshop, conference, journal club, or simply carrying dissertation-related activities. A student can register for up to 9 credits of reading and research per semester during fall and spring semesters and up to 6 credits during the summer. Students should register for dissertation credits in the semester they intend to defend their dissertation.

Fields of Study

- Bioinstrumentation
- Biomechanics
- Biomedical Imaging
- Cellular and Molecular Engineering
- Computational Biology and Bioinformatics
- Rehabilitation Bioengineering

Required Courses

All doctoral students must complete courses that satisfy the following competencies:

BIOM 6953/*BIEN 6953. Seminar in Biomedical Engineering. *0 credits.*

Scholarly presentations on current topics in biomedical engineering and related areas by visiting professors, resident faculty, and graduate students. Attendance is required of all full-time BME graduate students.

Bioethics (2 credits required)

BIOE 10222 Ethics and Integrity in Science and Course. *1 credit.*

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered during the spring and summer terms only.

BIOE 10444 Research Ethics Discussion Series. *1 credit.*

Prerequisite: 10222 Ethics and Integrity in Science.

The course is directed by members of the Bioethics Faculty and provides facilitated discussions of a series of topics in research ethics. Discussions are led by members of the Basic Science faculty and are focused on ethical issues that commonly come up in biomedical research. The course is meant to not only reinforce the basic ethics taught in the online course Ethics and Integrity in Science, which is a prerequisite, but also to explore the gray areas of the individual topics. The intent is to offer students illustrative examples of ethical issues that might arise in their careers, to emphasize the ethical principles that apply in such situations, and to provide practical guidance on how these types of situations should be correctly handled. This course is offered as a discussion series. Students are expected to attend and participate in the discussion. Bioethics 10444 is offered during the spring terms only.

Biomedical Sciences (3 credits required)

This core course can cover: cellular and systems physiology, neurophysiology, intra- and intercellular signaling, genetics and developmental biology, pharmacology, cellular pathology and immunology, microbiology, molecular biology, biochemistry).

BIOM 5700/*BIEN 5700. Systems Physiology. *3 credits.*

Analyses of the underlying physiologic and bioengineering aspects of the major cell and organ systems of the human from an engineer's point of view. Classic physiologic approaches used to introduce topics including cell functions, nervous system, nerve, muscle, heart, circulation, respiratory system, kidney, reproduction, and biomechanics. Design problems including models of cell-organ-system function and problems in biomechanics illuminate topics covered. Computer techniques and relevant instrumentation are incorporated. Experts on related topics are invited to speak as they are available.

*BIOL 5703. Exercise Physiology. *3 credits*.

Course offered through Marquette University only. See the MU bulletin for more details.

BIOM 5720/*BIEN 5720 Cardiopulmonary Mechanics. *3 credits*.

Examination of the physiological behavior of the cardiovascular and pulmonary systems from an engineering perspective. Emphasis is on understanding the mechanical basis of physiologic phenomena via experimental models.

BIOM 6931/*BIEN 6931 Topics in Biomedical Engineering. *3 credits*.

Subject matter variable as determined by needs of biomedical graduate students. Students may enroll more than once as the subject matter changes. Possible topics: biostatistics, experimental methods, neuro-anatomy, etc.

PHYS 08204 Graduate Human Physiology. *3 credits*.

This course provides the fundamental aspects of: 1) cell membrane transport, 2) smooth, skeletal, and cardiac contractile mechanisms and excitation-contraction coupling, 3) principles of synaptic transmission, neurotransmitters, and neuromodulators, 4) respiratory mechanics, gas exchange in the lung, and control of breathing, 5) cardiac electrophysiology, hemodynamics, nervous and humoral control of the heart and cardiac output, 6) renal tubular transport, glomerular filtration, and regulation of sodium and water balance, 7) neural and humoral control of gastrointestinal absorption and motility, and 8) endocrinology including pituitary, adrenal cortical, thyroid, pancreatic and male and female reproductive organs. Material will be covered primarily in lecture format by expert physiologists in each respective area.

Biostatistical Methods (3 credits)

BIOS 04224 Biostatistical Computing. *3 credits*.

Prerequisites: Statistical Models and Methods I or concurrent registration

This course will cover the details of manipulating and transforming data required for statistical analysis. Topics include reshaping the data from a per-case to a per-event within a case and vice-versa. It will also cover the techniques necessary to write functions and macros in both SAS and R for developing new/modified data analysis methods. How to use R packages and C/C++ codes in R will also be covered. The LaTeX document production system is also introduced.

BIOS 04231 Statistical Models and Methods I. *3 credits*.

Prerequisite: Three semesters of calculus and one semester of linear algebra

This course will cover statistical techniques for basic statistics. Topics include one-sample/two sample

tests, analyses for count data and contingency tables, basic nonparametric methods including sign, rank-sum and signed-rank tests, simple linear regression model and inference, checking model assumptions, model diagnostics, correlation analysis, one-way analysis of variance, Kruskal-Wallis one-way ANOVA, simple logistic regression, and weighted linear regression. SAS/R will be used throughout the course.

BIOS 04232 Statistical Models and Methods II. *3 credits.*

Prerequisite: Statistical Models and Methods I

This course will cover various regression models for independent and correlated data. Topics include multiple linear regression, model diagnostics, variable selection, influence/leverage, outliers, collinearity, transformation, GLM including logistic and Poisson regression, overdispersion, GEE, mixed models, and GLMM. SAS/R will be used throughout the course.

BIOS 04233 Introduction to Statistical and Machine Learning. *3 credits.*

Prerequisite: Statistical Models and Methods II

This course will provide an introduction to statistical learning. Core topics include variable selection, penalized linear regression such as lasso, dimension reduction including principal component analysis, flexible regression techniques including kernel smoothing/smoothing splines/generalized additive models/regression trees, support vector machine, clustering, and random forests. Other topics that can be covered include but are not limited to ridge regression, group lasso, fused lasso, adaptive lasso, SCAD, Bayesian lasso, Bayesian group lasso, Bayesian CART, BART, neural network, feature screening, graphical models, and quantile regression.

BIOS 04363 Advanced Statistics I. *3 credits.*

Prerequisites: Statistical Models and Methods II, Statistical Inference II

This course covers both the theoretical framework and practical aspects of statistical models. The course will cover likelihood inference, properties of likelihood, exponential families and GLM, large sample properties of likelihood-based inference, likelihood based regression models, GEE, conditional and marginal likelihood, asymptotics of penalized regression.

BIOS 04365 Linear Models I. *3 credits.*

Prerequisites: Statistical Inference II

This course will cover review of matrix algebra and vector spaces, multivariate normal distribution, quadratic forms, least squares estimation, ANOVA, testing contrasts, multiple comparison, lack-of-fit test, multiple regression models, and mixed models. Emphasis is on theory.

*MSCS 5720. Statistical Methods. *3 credits.*

Course offered through Marquette University only. See the MU bulletin for more details.

*MSCS 5740. Biostatistical Methods and Models. *3 credits.*

Course offered through Marquette University only. See the MU bulletin for more details.

Biomedical Signal Processing (3 credits)

BIOP 03240 Fourier Transforms. *3 credits.*

Material covers theory of Fourier transforms, digital transforms, NMR images, reconstruction, pulse spectroscopy methods, and electrical signal processing. An understanding of calculus and tensor vectors is recommended.

BIOM 5510/*BIEN 5510. Image Processing for the Biomedical Sciences. *3 credits*.
Introduces biomedical image processing. Topics explored include: the human visual system, spatial sampling and digitization, image transforms, spatial filtering, Fourier analysis, image enhancement and restoration, nonlinear and adaptive filters, color image processing, geometrical operations and morphological filtering, image coding and compression image segmentation, feature extraction and object classification. Applications in diagnostic medicine, biology and biomedical research are emphasized and presented as illustrative examples.

BIOM 6200/*BIEN 6200. Biomedical Signal Processing. *3 credits*.

Prerequisite: MATH 2451; and proficiency in C or FORTRAN.

Introduces students to statistical processing of biomedical data. Topics include data acquisition, probability and estimation, signal averaging, power spectrum analysis, windowing, digital filters, and data compression. Students complete several computer projects which apply these processing methods to physiologic signals.

BIOM 6210/*BIEN 6210. Advanced Biomedical Signal Processing. *3 credits*.

Prerequisite: BIEN 6200 or equiv.; knowledge of C or FORTRAN.

Covers modern methods of signal processing encountered in the bio-medical field including parametric modeling, modern spectral estimation, multivariate analysis, adaptive signal processing, decimation/interpolation, and two-dimensional signal analysis. Students complete several computer projects which apply these modern techniques to physiologic data.

Advanced Engineering Mathematics (3 credits)

*EECE 6010. Advanced Engineering Mathematics. *3 credits*.

Prerequisite: MATH 2451 or equivalent and proficiency in computer programming.

Course offered through Marquette University only. See the MU bulletin for more details.

*MEEN 6101. Advanced Engineering Analysis I. *3 credits*.

Course offered through Marquette University only. See the MU bulletin for more details.

BIOM 6500/*BIEN 6500. Mathematics of Medical Imaging. *3 credits*.

Begins with an overview of the application of linear systems theory to radiographic imaging (pinhole imaging, transmission, and emission tomography), and covers the mathematics of computed tomography including the analytic theory of reconstructing from projections and extensions to emission computed tomography and magnetic resonance imaging. Topics may also include three-dimensional imaging, noise analysis and image quality, and optimization. Contains advanced mathematical content.

Computational Simulation Methods (3 credits)

BIOM 5710/*BIEN 5710. Analysis of Physiological Models. *3 credits*.

Development of continuous (compartmental) and distributed-in-space-and-time mathematical models of physiological systems and molecular events. Analytical and numerical methods for solving differential equations of the initial and boundary value types. Simulation of model response, and estimation of model parameters using linear and nonlinear regression analysis.

BIOM 6620/*BIEN 6620. Modeling Rehabilitative Biosystems. 3 credits.

Prerequisites: BIEN 5710 Analysis of Physiological Models and BIEN 5700 Systems of Physiology

Introduction to large-scale mathematical models of various physiological systems of interest in rehabilitation (e.g., cardiovascular, pulmonary, musculoskeletal, etc.). Discusses mathematical modeling, a widely used tool for testing hypothesis regarding the underlying mechanisms of complex systems such as physiological systems in health, disease, and recovery. For each, simulation is used to further our understanding of the adaptive processes of these systems in response to physiological/pathophysiological stresses and rehabilitative interventions.

BIOM 35284. Computational Methods for Biomedical Research. 3 credits.

This course focuses on modeling and computational techniques for simulation and analysis of biological systems, developed largely through application-driven examples. Examples will be developed to a depth at which models will be used to analyze real biological or physiological data. To accomplish this, the important details of the underlying biological systems must be described along with a complete step-by-step development of model assumptions, the resulting equations, and (when necessary) computer code.

BIOM 35285. Mathematical Biology. 3 credits.

This course teaches the students how to express physiological problems in equations and how to solve such equations. Emphasis on physiological problem-solving methods rather than mathematical theory. Topics include the application of matrices, differential equations, and numerical analysis to problems in bioelectricity, biomechanics, and optics.

Elective Courses

Specialization-specific courses are selected in consultation with the student's Dissertation Director. Students will take 19 credits worth of these courses. PhD students in the BME Department are also required to register for the BME Department seminar series for the duration of their study (BIEN 6953, which counts for 1 credit/semester of reading and research). For a given semester, students are expected to attend at least two thirds of the seminars.

Notes

**Courses offered at Marquette University*

Please see Biomedical Engineering Handbook for additional information.

[*Please see Biomedical Engineering Handbook for additional information.](#)

Biomedical Engineering, Master of Science

Biophysics, Doctor of Philosophy

Program Description

The Biophysics Graduate Program encourages applications from students with strong backgrounds in chemistry, biology, biochemistry, biomedical engineering, physics, or mathematics and an enthusiasm for carrying out scientific research. The Program consists of two major and largely independent sections—Molecular Biophysics and Magnetic Resonance Imaging. The Molecular Biophysics section is a component member of the [Interdisciplinary Program in Biomedical Sciences \(IDP\)](#) and students wishing to pursue this track should apply to the IDP. The faculty in this section use biophysical techniques to study structural biology, free radicals in biology, and paramagnetic metal ions in biological systems. For example, current research includes studies on protein structure, functional dynamics, and free radical spin trapping. The Magnetic Resonance Imaging section emphasizes research in the areas of cognitive neuroscience, signal processing, statistical analysis, image production, and hardware development. Students wishing to pursue this track should apply directly to the Biophysics Graduate Program or through the [Neuroscience Doctoral Program \(NDP\)](#). Applicants to this track are expected to have a high level of competence in physics and mathematics. Both tracks accept students from the [Medical Scientist Training Program \(MSTP\)](#).

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Students should have a strong foundation in quantitative, behavioral, and biological sciences.

Fields of Study

- Protein structure and functional dynamics studies using site-directed spin labeling EPR spectroscopy.
 - Structure-function relationships for membrane proteins; protein folding and dynamics; antibiotic peptides.
 - Structure and function of proteins embedded in cellular membranes using NMR spectroscopy.
 - Molecular mechanisms of membrane protein function; role of protein conformational heterogeneity; GPCRs.
 - Magnetic resonance (EPR, NMR, MRI) technology development.
 - Biological chemistry of nitric oxide and related species in physiology and pathology.
- Oxidative biology of sickle cell disease.

- Spin label studies on membrane dynamics and organization (raft- domain formation); spin label oximetry.

- Electron spin resonance studies of oxygen radicals and reactive nitrogen species in biological systems; cardiovascular and neuro-degenerative pathologies (atherosclerosis, hypertension, ALS, Alzheimer's disease, etc.), free radicals in apoptosis and signal transduction, and chemotherapeutic drug-induced toxicity.

BIOPHYSICS

Degree Offered: Doctor of Philosophy

- Investigation of pathophysiological mechanisms enhancing free radical formation from nitric oxide synthase in vascular cells and their relation to the tetrahydrobiopterin pathway.
- Mapping of human brain language systems with magnetic resonance imaging (MRI).
- Development and employment of MRI techniques to diagnose and monitor injuries and diseases of the central nervous system.
- Mapping of activity in human brain visual systems with MRI.
- Characterization of brain cancer tumor cellularity and vascularity through diffusion and perfusion MRI; development of image processing techniques to help clinicians plan surgery and map out brain function for epilepsy.
- Functional MRI study of mechanism of anesthesia with respect to loss and return of consciousness as studied by electrophysiological and brain imaging methods, and of Alzheimer's disease and drugs of abuse.
- Address engineering challenges in diagnostic imaging to achieve higher sensitivity and specificity to the pathophysiology of various diseases, through of novel hardware and imaging protocols for MRI systems.
 - o Metal artifact reduction methods for MRI; quantitative susceptibility mapping in MRI.
- Development of multiband or simultaneous multislice imaging technology.
- In vivo quantification of tissue perfusion using exogenous and endogenous contrast agents coupled with MRI.
- Development of MRI methods to assess brain tumor angiogenesis and invasion.

Credits Required to Graduate

60 credits minimum

Required Courses

10222 Ethics and Integrity in Science. *1 credit.*

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered during the spring and summer terms only.

10444 Research Ethics Discussion Series. *1 credit.*

Prerequisite: 10222 Ethics and Integrity in Science.

The course is directed by members of the Bioethics Faculty and provides facilitated discussions of a series of topics in research ethics. Discussions are led by members of the Basic Science faculty and are focused on ethical issues that commonly come up in biomedical research. The course is meant to not only reinforce the basic ethics taught in the online course Ethics and Integrity in Science, which is a prerequisite, but also to explore the gray areas of the individual topics. The intent is to offer students illustrative examples of ethical issues that might arise in their careers, to emphasize the ethical principles that apply in such situations, and to provide practical guidance on how these types of situations should be correctly handled. This course is offered as a discussion series. Students are expected to attend and participate in the discussion. Bioethics 10444 is offered during the spring terms only.

Molecular Biophysics Track

After completing the first year IDP or MSTP curriculum, students will take the following required courses:

03223 Electron Spin Resonance. *3 credits.*

The aim of the course is to provide an introduction to the theory and practical applications of modern electron spin resonance (ESR) spectroscopy. Basic ESR theory, biological free radical spectroscopy, relaxation and motional phenomena, spin labeling, and transition metal ESR are among the topics covered.

03226 Biophysical Techniques in Biochemistry. *3 credits.*

This course will introduce the basic theory and practical applications of an array of biophysical techniques commonly used in biochemical research. Optical and magnetic spectroscopies, X-ray crystallography, and kinetics techniques are a sampling of the topics covered in this comprehensive course.

03298 Journal Club: EPR. *1 credit.*

EPR Journal Club introduces students to the various aspects of EPR via published studies in the scientific literature. Students present selected papers to the class, along with any introduction to the area of study, and the class critically discusses each paper. Students will encounter aspects of EPR that they may not have previously encountered through either classes or their research, but which may be of value to their doctoral research or future research, teaching, or other careers.

03295 Reading and Research. *1-9 credits.*

The course of study for Reading and Research is designed by each student with his/her advisor to focus on readings in literature in the student's field, to build bibliographic resources for the dissertation, and to conduct supervised, independent research.

03300 Seminar. *1 credit.*

Weekly invited seminar speakers present their research on Molecular Biophysics and Magnetic Resonance Imaging topics.

03399 Doctoral Dissertation. *1-9 credits.*

This course is required for the completion of the PhD degree. The PhD candidate must submit a dissertation based on original research of a high scholarly standard that makes a significant contribution to knowledge in their chosen field.

Magnetic Resonance Imaging Track

After completing the first year NDP or MSTP curriculum, students will take these required courses:

03230 Nuclear Magnetic Resonance. *3 credits.*

This course is designed as an introduction to NMR and nuclear MRI. Emphasis will be given to theory and application of modern MRI techniques.

03239 Functional MRI Contrast Mechanisms and Applications. *3 credits.*

The use of MRI to evaluate tissue function will be described. The course will be dedicated to discussing functional MRI methods that use both endogenous contrast (labeled water, deoxygenated blood and exogenous (injectable) MR contrast agents to image tissue function. The theory and physiology necessary for understanding the MR contrast mechanisms, together with the practical knowledge necessary for performing the MR experiments, will be discussed. Demonstrations of functional MRI experiments will be included.

03295 Reading and Research. *1-9 credits.*

The course of study for Reading and Research is designed by each student with his/her advisor to focus on readings in literature in the student's field, to build bibliographic resources for the dissertation, and to conduct supervised, independent research.

03297 Journal Club: MRI. *1 credit.*

Selected papers in theory, practice, and applications of electron and NMR will be read and discussed.

03300 Seminar. *1 credit.*

Weekly invited seminar speakers present their research on Molecular Biophysics and Magnetic Resonance Imaging topics.

03399 Doctoral Dissertation. *1-9 credits.*

This course is required for the completion of the PhD degree. The PhD candidate must submit a dissertation based on original research of a high scholarly standard that makes a significant contribution to knowledge in their chosen field.

Required Courses as Needed

03002 Master's Thesis Continuation. *1-6 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

03003 Doctoral Dissertation Continuation. *6-9 credits.*

This is a form of registration available to students who have completed all of the required coursework, including dissertation credits but have not yet completed the writing of the Dissertation. Continuation status is limited to three consecutive terms following the completion of Dissertation credits.

03299 Master's Thesis. *1-6 credits.*

Students in the Ph.D. degree program who cannot or elect not to complete that program may be allowed to transfer to the Master's program. This transfer must be approved by the student's advisor, the Program Director, the Chair, and the Graduate School. To transfer to the Master's Program, the student must be in good academic standing according to regulations established by the Graduate School.

Elective Courses

Molecular Biophysics Track

This track is a component member of the IDP. After completing the first year IDP, students can take the following elective courses:

03220 Introduction to Magnetic Resonance. *3 credits.*

The course provides basic knowledge for students who will continue to study ESR or nuclear magnetic resonance (NMR). The material covers MR of the hydrogen and helium atoms, NMR spectra in liquids, basic ESR of radicals in solution, trapped radicals in solids, triplet states, spin relaxation, molecular rate processes, and double resonance. An understanding of matrix elements, eigenvalues, angular momentum, and tensor vector is recommended.

03251 Free Radicals in Biology. *3 credits.*

Topics to be discussed include the nature of free radicals; radical initiation, propagation, and termination; free radical reactions of biological interest; and the role of free radicals in physiological and pathological processes.

03260 Special Topics in Molecular Biophysics. *3 credits.*

This is an advanced course dealing with special topics including free radicals in biology, spin relaxation, metal ions in biology, X-ray crystallography, and photobiology.

Magnetic Resonance Imaging Track

03240 Fourier Transforms. *3 credits.*

This course provides basic knowledge for students who will continue to study EPR or MRI. Material will cover the theory of Fourier transforms, digital transforms, MRI image generation, Fourier image reconstruction, and digital signal processing. An understanding of calculus and matrix algebra is recommended.

Biostatistics & Data Science, Master of Arts

Program Description

The Master of Arts program in Biostatistics and Data Science provides a learning experience focused on solid theoretical foundation and practical experience. Robust course offerings, active engagement in statistical consulting, and a capstone project create ample opportunities to develop essential analytical skills. Consulting projects ranging from the simplest statistical summaries to the most complex protocols and data collection schemes allow students to get experience of working with real data analysis projects from start to finish. This hands-on experience will enable students to synthesize the acquired knowledge and integrate various courses they have taken. In the process, students will create a portfolio which demonstrates competency in data analysis, statistical programming, consulting experience with non-statisticians, oral and written communication skills.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements:

- Any graduate of an accredited college or university with an undergraduate degree in mathematics, statistics, or related field with strong preparation in mathematics is eligible for admission.
- Prior coursework in calculus (including integrals, such as Calculus II), probability and/or statistics, linear/matrix algebra, and computer programming experience.

Credits Required to Graduate 31 credits

Program Credit Requirements

The curriculum consists of eight required biostatistics courses which have been identified as an essential knowledge base for all students in the program. Also required, is an Ethics and Integrity in Science course. The capstone project course can be taken throughout multiple semesters but at least 3 credit hours are required for graduation. The program allows for students to choose two or more elective courses which best reflect their personal interests. Students may pursue the degree on a full-time or part-time basis.

Required Courses

BIOE 10222 Ethics and Integrity in Science. *1 credit.*

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered during the spring and summer terms only.

BIOS 04221 Biomedical Applications and Consulting. *3 credits.*

Prerequisites: 04231/04232 Statistical Models and Methods I & II

Theory of consulting, communication and statistical techniques most often used in consulting and biomedical applications, practical experience in the real consulting setting and writing statistical reports.

BIOS 04224 Biostatistical Computing. *3 credits.*

Prerequisites: 04231 Statistical Models and Methods I or concurrent registration

This course will cover the details of manipulating and transforming data required for statistical analysis. Topics include reshaping the data from a per-case to a per-event within a case and vice-versa. It will also cover the techniques necessary to write functions and macros in both SAS and R for developing new/modified data analysis methods. How to use R packages and C/C++ codes in R will also be covered. The LaTeX document production system is also introduced.

BIOS 04231 Statistical Models and Methods I. *3 credits.*

Prerequisite: Three semesters of calculus and one semester of linear algebra

This course will cover statistical techniques for basic statistics. Topics include one-sample/two-sample tests, analyses for count data and contingency tables, basic nonparametric methods including sign, rank-sum and signed-rank tests, simple linear regression model and inference, checking model assumptions, model diagnostics, correlation analysis, one-way analysis of variance, Kruskal-Wallis one-way ANOVA, simple logistic regression, and weighted linear regression. SAS/R will be used throughout the course.

BIOS 04232 Statistical Models and Methods II. *3 credits.*

Prerequisite: 04231 Statistical Models and Methods I

Factorial, nested, split-plot and repeated measures designs, multiple regression and variable selection, multiple comparisons, logistic regression, discriminant analysis, principal components and factor analysis, rates and proportions, introduction to survival analysis.

BIOS 04233 Introduction to Statistical and Machine Learning. *3 credits.*

Prerequisite: 04232 Statistical Models and Methods II

This course will provide an introduction to statistical learning. Core topics include variable selection, penalized linear regression such as lasso, dimension reduction including principal component analysis, flexible regression techniques including kernel smoothing/smoothing splines/generalized additive models/regression trees, support vector machine, clustering, and random forests. Other topics that can be covered include but are not limited to ridge regression, group lasso, fused lasso, adaptive lasso, SCAD, Bayesian lasso, Bayesian group lasso, Bayesian CART, BART, neural network, feature screening, graphical models, and quantile regression.

BIOS 24150 Bioinformatics in Omics Analysis. *3 credits.*

Prerequisites: 04231 Statistical Models and Methods I and Biostatistical Computing, or consent of instructor

The course aims to introduce modern statistical and computational methods in high throughput omics data analysis. The first half of the course focuses on fundamental statistical and computational methods applicable in different types of high-throughput omics data. The second half covers selected important topics in bioinformatics and aims to give students a systematic view of the omics data analysis. The goals of the course include: (1) to motivate students from quantitative fields into omics research (2) to familiarize students from biological fields with a deeper understanding of statistical methods (3) to promote inter-disciplinary collaboration atmosphere in class. Students are required to have a basic statistical training (i.e., elementary statistics courses, basic calculus, and linear algebra) and basic programming proficiency (R programming is required for homework and the final project).

BIOS 24160 Concepts in Probability and Statistics. *3 credits.*

Prerequisites: Calculus I and II

The course is designed for graduate students who have a background in statistics but would benefit from a review of the basic concepts in probability and statistics. It focuses on the properties of random variables including distributions, expectations, and variability measures. Topics in inferential statistics covered in this course include estimation, hypotheses testing methods for categorical data tabulation and analysis. It also includes an overview of statistical techniques based on simulations and resampling. Key features of Bayesian analysis will be covered as well. After completion of the course, students should be well prepared for taking more advanced courses in statistics, both theoretical and applied.

BIOS 24297 Capstone Project. *1-3 credits.*

Prerequisites: 04232 Statistical Models and Methods II

The course is the culmination of the MA program in Biostatistics. Students will complete a project integrating their statistical analysis, data science, and application domain knowledge. The project results in a written report and presentation which will improve students' ability to communicate effectively about statistics and data science in written and oral form using both technical and nontechnical language. In addition, the project will enable students to expand their professional portfolio of coding samples, written reports, and presentations.

Elective Courses

BIOS 04214 Design and Analysis of Clinical Trials. *3 credits.*

Prerequisites: 04231 Statistical Models and Methods I or concurrent registration

This course covers issues in clinical trials including the clinical trial protocol, sources of bias in clinical trials, blinding, randomization, sample size calculation; phase I, phase II, phase III and hybrid trials; interim analysis, stochastic curtailment, Bayesian designs, and administrative issues in study design.

BIOS 04222 Statistical Consulting. *3 credits.*

Prerequisites: 04231/04232 Statistical Models and Methods I & II

This course is designed for students to gain experience in statistical consulting by working with the biostatistics faculty members on various consulting projects.

BIOS 04275 Applied Survival Analysis. *3 credits.*

Prerequisites: 04231 Statistical Models and Methods I

The following topics will be covered in this course: Basic parameters in survival studies; Censoring and truncation, competing risks; Univariate estimation including the Kaplan-Meier and Nelson-Aalen estimator; tests comparing two or more populations, the log rank test; Semi-parametric regression, the Cox model; Aalen's Additive hazards regression model; regression diagnostics.

BIOS 04285 Introduction to Bayesian Analysis. *3 credits.*

Prerequisites: 04231 Statistical Models and Methods I

This course introduces basic concepts and computational tools for Bayesian statistical methods. Topics covered include one and two sample inference, regression models and comparison of several populations with normal, dichotomous and count data.

PUBH 18201 Principles of Public Health Data and Epidemiology. *3 credits.*

The Principles of Public Health Data and Epidemiology course examines the basic epidemiological concepts required by a health professional, including disease transmission and prevention; morbidity, vital statistics, and mortality; screening tests; the natural history of disease; clinical trials; cohort study designs; case control and cross-sectional study designs; measures and risks in populations; disease causation; and epidemiology as it relates to program evaluation and public policy.

Principles of Public Health Data and Epidemiology provides the student with an understanding of the distribution and determinants of health and disease in population groups. Epidemiology is considered the basic science of public health, and, as such, provides the foundation for many other courses in the MPH program; it is particularly germane to Community Health Assessment and Environmental Health.

PUBH 18258 Advanced Epidemiological Methods. *3 credits.*

Epidemiologic Methods builds on introductory epidemiology courses by providing a more in depth understanding of fundamental epidemiologic principles presented in introductory epidemiologic courses such as study design and bias. In addition, Epidemiologic Methods emphasizes more advanced concepts needed in establishing causal relationships from observational data. It is particularly relevant to students who intend to conduct studies investigating the occurrence and determinants of diseases or who wish to be sophisticated consumers or critics of epidemiologic research conducted by others. The course emphasizes practical application of Epidemiologic Methods to real world problems.

PUCH 19150 Introduction to Epidemiology. *3 credits.*

The course provides: 1) an overview of epidemiologic concepts; 2) an introduction to the approaches and techniques that are used to measure and monitor health status in populations; 3) an introduction to study designs to assess disease prevention and intervention; and 4) an introduction to clinical research study designs that elucidate causative factors for disease.

PUCH 19210 Health and Medical Geography. *3 credits.*

Geography and physical and social environments have important implications for human health and health care. This course will explore the intersections among geography, environments, and public health, with an emphasis on geographical analysis approaches for health data, to address two key questions: (1) How can concepts from geography help us to better understand health and well-being? (2) How can geographic tools, such as Geographic Information Systems (GIS) be used to address pressing questions in health and medical research? Students will become acquainted with theories and methods from health and medical geography through readings, discussion, Geographic Information Systems (GIS) laboratory exercises, and the completion of a focused course project. Throughout the semester we will use the concepts and techniques of the discipline of geography to investigate a variety of health-related topics, and laboratory exercises will center on common health and medical geography research questions. Course projects will allow students to develop a deep understanding of the geographical nature of a health problem of their choosing and will incorporate both literature review and the analysis of geographical data.

PUCH 19229 Survey Research Methods. *3 credits.*

Survey Research Methods is a graduate-level, 3-credit hour course that introduces students to the broad concepts of survey design, conduct, and analysis. Students will gain a detailed and comprehensive understanding of questionnaire design, sampling, data collection, survey nonresponse, and analysis of survey data. The course will include lectures, reading assignments, class discussions, individual and group presentations, and exams.

CTSI 20151 Introduction to Epidemiology. *3 credits.*

This course provides an introduction to the concepts, principles, and research methods specific to epidemiology. Students will learn about population health, how to select appropriate study designs for collecting evidence for medical practice, how to summarize evidence for medical practice and how to translate evidence into medical practice. By the end of the course, students should be able to apply the skills learned to assess the health of a population, describe determinants of health, and select an appropriate study design to evaluate population health.

Cell and Developmental Biology, Doctor of Philosophy

Program Description

The graduate program in Cell and Developmental Biology (CDB) provides state of the art research training in cellular based experimental biology, including studies of organismal development, cell and organ homeostasis, and mechanisms of disease. Specific areas of focus include regulation of cellular differentiation, the molecular basis of regeneration, how neurons sense their environment, the intricacies of signal transduction, and the mechanisms of disease pathology. The graduate program is hosted by the Department of Cell Biology, Neurobiology and Anatomy, but includes faculty mentors across multiple Departments and Centers of the Medical College of Wisconsin. Students enter CDB through one of several routes: Direct Admission, the Interdisciplinary Program in Biomedical Sciences (IDP), the Neuroscience Doctoral Program (NDP), or the Medical Scientist Training Program (MSTP). Successful completion of this program leads to a Doctor of Philosophy (PhD) degree. This is accomplished through a combination of coursework, seminars, journal clubs, and "hands-on" research in the laboratory of a faculty mentor. CDB graduates have outstanding track record of entering a wide variety of research-related careers including academic post-doctoral research fellowships, industry research scientist positions, employment with consulting firms, science writing positions, among other professions.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has no additional specific requirements.

Entry to the Cell and Developmental Biology Graduate Program is through Direct Admission, [Interdisciplinary Program in Biomedical Sciences](#) (IDP), [the Neuroscience Doctoral Program](#) (NDP), or the [Medical Scientist Training Program](#) (MSTP). The student is admitted after completion of the first-year curriculum or through the Medical Scientist Training Program following the second year of Medical School. The student elects to complete their dissertation work with faculty of the Cell and Developmental Biology Graduate Program. The student will then have the opportunity to continue graduate studies by selecting among a wide range of courses offered from the Graduate School as well as other programs affiliated with the Medical College. Courses to be taken are based on the student's interests and consultation with the student's advisor.

Fields of Study

Cellular and molecular mechanisms in developmental biology and neurobiology, which employ genetic approaches, including those in mice, zebrafish, stem cells, and invertebrate organisms.

- Development and diseases of the heart, liver, intestine, muscle and the nervous system.
- Mechanisms of pain.
- Biology of vision.
- Mechanisms of cell signaling.
- Mechanisms of regeneration.

- Neuronal homeostasis and neurodegeneration.
- Molecular basis of drug interactions.

Credits Required to Graduate

60 credits minimum

Program Credit Requirements

Nine credits coursework after the first-year semester is completed.

The curriculum consists of a core of courses required by the Graduate Entry Programs, plus additional courses selected by the student. In addition, Readings and Research is taken annually. Attendance at the departmental sponsored presentations is considered a major part of the educational experience.

Required Courses

10222 Ethics and Integrity in Science. *1 credit.*

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered during the spring and summer terms only.

10444 Research Ethics Discussion Series. *1 credit.*

Prerequisite: 10222 Ethics and Integrity in Science.

The course is directed by members of the Bioethics Faculty and provides facilitated discussions of a series of topics in research ethics. Discussions are led by members of the Basic Science faculty and are focused on ethical issues that commonly come up in biomedical research. The course is meant to not only reinforce the basic ethics taught in the online course Ethics and Integrity in Science, which is a prerequisite, but also to explore the gray areas of the individual topics. The intent is to offer students illustrative examples of ethical issues that might arise in their careers, to emphasize the ethical principles that apply in such situations, and to provide practical guidance on how these types of situations should be correctly handled. This course is offered as a discussion series. Students are expected to attend and participate in the discussion. Bioethics 10444 is offered during the spring terms only.

31295 Reading and Research. *1-9 credit(s).*

The course of study for Reading and Research is designed by each student with his/her advisor to focus on readings in literature in the student's field, to build bibliographic resources for the dissertation, and to conduct supervised, independent research.

31399 Doctoral Dissertation. *9 credits.*

This course is required for the completion of the PhD degree. The PhD candidate must submit a dissertation based on original research of a high scholarly standard that makes a significant contribution to knowledge in their chosen field.

Required Courses as Needed

31002 Master's Thesis Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

31003 Doctoral Dissertation Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including dissertation credits but have not yet completed the writing of the Dissertation. Continuation status is limited to three consecutive terms following the completion of Dissertation credits.

31299 Master's Thesis. *1-6 credit(s).*

Students in the PhD degree program who cannot or elect not to complete that program may be allowed to transfer to the Master's program. This transfer must be approved by the student's advisor, the Program Director, the Chair, and the Graduate School. To transfer to the Master's Program, the student must be in good academic standing according to regulations established by the Graduate School.

Elective Courses

Electives are chosen by the student in concert with faculty advisor to best support area of interest and the student's thesis proposal. While there are no specific course requirements, CDB students often take several of the following:

12221 Advanced Systems Neuroscience. *3 credits.*

Prerequisite: 12211 or consent of the course director.

Readings and discussion in cellular, molecular, and developmental neurobiology. Among the topics covered in this course are ion channels and the ionic basis of potentials; mechanisms of synaptic transmission; neurotransmitter receptors and their receptors; sensory signal transduction and neural development.

12237 Cellular and Molecular Neurobiology. *3 credits.*

Prerequisite: 12211 or consent of the course director.

Readings and discussion in cellular, molecular, and developmental neurobiology. Among the topics covered in this course are ion channels and the ionic basis of potentials; mechanisms of synaptic transmission; neurotransmitter receptors and their receptors; sensory signal transduction and neural development.

16271 Fundamentals of Neuroscience. *3.5 credits.*

Fundamentals of Neuroscience follows a multidisciplinary approach to current knowledge about the structural and functional properties of the nervous system. The mechanisms of the nervous system are described at the molecular, cellular, systems and complex brain function levels. The course includes in-class lectures, seminars from prominent scientists (video archives), and written assignments. The purpose of this course is to introduce 1st year graduate students to the structure and function of the human nervous system.

16273 Advanced Cell Biology. *3 credits.*

Advanced Cell Biology is an upper level, 3-credit hour cell biology course that focuses on a variety of advanced topics in contemporary Cell Biology. Students will gain an in depth understanding of specific selected topics through the use of a variety of resources including web-based webinars and podcasts, detailed in-class discussion of papers from the scientific literature and through preparation and presentation of a lecture on a cell biological topic directly relevant to the student's own research interests. Lectures by faculty will be minimized.

16276 Developmental and Stem Cell Biology. *3 credits.*

The offered course provides a detailed introduction to Developmental and Stem Cell Biology. The course uses a lecture-style format supplemented with paper discussions. The intent of the course is to provide a solid academic background in developmental biology to graduate students embarking upon research into cell differentiation and development.

31154 Neurobiology of Pain. *1 credit.*

This course will provide students with an overview of pain neurobiology. By the end of this course, students should be able to: 1. Describe the molecular mechanisms underlying noxious stimuli detection and transmission in the peripheral and central nervous systems. 2. Illustrate the peripheral and central anatomical circuits important for pain sensation and perception. 3. Easily and appropriately discuss concepts that are part of the pain basic science vernacular (e.g., "nociceptor" "gate theory", "wind up", "central sensitization") 4. Identify important questions that have yet to be answered in the field of pain basic science.

31207 Introduction to Neuroscience. *2 credits.*

This course provides an introduction to the neurosciences. A brief but integrated overview of neuroanatomy, neurophysiology and neurochemistry will be provided. The course consists of both lectures and laboratory exercises.

31257 Biology of Vision. *3 credits.*

This course covers core fundamentals in ocular biology and vision. Emphasis is placed on anatomy, pathology, and cellular function within the eye. In addition, visual processing within the central nervous system will also be presented. Core topics include overall eye globe anatomy, development of neural and non-neural systems, basic retinal circuitry and physiology, phototransduction, cell biology of photoreceptor cells and the retinal pigment epithelium, central anatomy and higher order processing, energy metabolism in the visual system, emmetropization and myopia, aqueous humor physiology, glaucoma, photoreceptor diseases, and cornea biology.

31298 Journal Club. *1 credit.*

Critical reviews of current research topics.

Clinical Bioethics, Certificate

Program Description

The Certificate in Clinical Bioethics program is designed to provide a foundational introduction to the philosophical, legal, and clinical foundations of health care ethics. Specifically designed to enhance the clinical practice of health care professionals or to provide a foundation for further study of bioethics for professionals and students in any discipline, the Certificate program is offered in an accessible online format available to individuals from across the nation and throughout the world.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has no additional specific requirements.

Credits Required to Graduate 12 credits

Program Credit Requirements

All courses of the Certificate program are delivered in an online format. The pedagogical capabilities of the online environment enhance the course discussions and allow for more individualized instructor feedback making the courses truly student-centered. Students receive a Certificate in Clinical Bioethics from the Medical College of Wisconsin's Graduate School of Biomedical Sciences upon completion of all four courses. Graduate credits accumulated in this program may be applicable toward the Master of Arts degree at the Medical College of Wisconsin.

Required Courses

10209 Clinical Topics in Bioethics. *3 credits.*

This course will provide an overview of the major areas of clinical bioethics. These are the topics that clinical ethicists commonly wrestle with in their role as consultation leaders, ethics committee members and teachers of contemporary bioethics. These have not yet been resolved to everyone's satisfaction. Students will examine informed consent, decision making, the role of advance directives, treatment limitations and appropriate end of life care. Further, students will look at the role of both physician and nurse in these dilemmas as well as the role of the ethics committee. Finally, students will tackle some more global issues that are still within the clinical arena--such as epidemiology and the concerns with emergency preparedness, institutional ethics and, and research ethics.

10210 Philosophical Bioethics. *3 credits.*

In this course, students will explore the foundations of philosophical ethics in the West, and how early themes shape current work in philosophical bioethics. To this end, students will read works by Aristotle, Kant, and Mill, focusing on their theoretical approaches to ethics. Detailed discussion will focus on the ethics theories known as virtue theory, casuistry, deontology, utilitarianism, communitarianism, and principlism, considering both their historical origins and modern interpretations. Students will apply these theories to topical themes of moral development, abortion, assisted death and others, noting their strengths and weaknesses.

10223 Law and Bioethics. *3 credits.*

This course provides an introduction to legal principles and legal precedent relevant to issues in bioethics, aimed at providing the foundation for understanding relevant law concerning these issues.

Elective Courses

For the elective course, students can choose one course from among the following selection of approved and offered courses, with the guidance of an advisor:

10203 Justice and Healthcare. *3 credits.*

This course will provide an overview of Justice and Health Care. We will begin with a close look at a number of philosophical perspectives on distributive justice, including John Rawls' Theory of Justice, Utilitarianism, Equality of Opportunity, various theories of Equality, and the concept of Triage. Students will then apply these perspectives to issues in access to healthcare/health insurance coverage, genetic enhancement, and the distribution of risks and benefits of medical research. The second part of the course will focus on the effects of managed care on contemporary medical practice in the US. In particular, students will examine how managed care arrangements alter the physician-patient relationship, the factors which have led to the development of managed care reimbursement systems, state and federal health care plans, and in particular the Oregon Plan.

10207 Introduction to Research Ethics. *3 credits.*

This course provides students with a comprehensive introduction to the ethical issues involved in scientific, animal and human subject's research. After a brief look back at the history of research ethics, students will spend time considering issues that impact research in both the laboratory setting and in the clinical setting. This course provides the necessary research ethics instruction required to satisfy the United States Public Health Service Policy on Instruction in the Responsible Conduct of Research for institutions receiving research funds from the Department of Health and Human Services. (Issued December 1, 2000.)

10233 Issues in Pediatric Ethics. *3 credits.*

This course will discuss the question of children's rights, the social value of children and cross-cultural issues of childhood. The objective of the course is to examine our individual assumptions about childhood and parenting that form the basis of approaches to pediatric ethics.

10234 Ethics and Human Reproduction. *3 credits.*

This course will provide an opportunity for students to explore some of the ethical issues related to human reproduction, including assisted reproductive technologies, genetics, and cloning. Students will also examine the various religious and philosophical arguments, as well as international perspectives, surrounding issues of human reproduction.

10240 History and Meaning of Ethics and Professionalism in Medicine. *3 credits.*

Medical ethics and professionalism have meant different things to different people for literally thousands of years. In this course, we will explore the history and meanings of medical ethics and medical professionalism from ancient times through contemporary challenges. We will delve into a variety of schools of thought on what it means, or should mean, to be a physician-learning from each other and through readings from disciplines including history, law, sociology, economics, political science, and philosophy. Special attention will be paid to the social roles of physicians, to the roles of professional associations, and the evolution of Codes of Ethics in medicine. The first part of the course is intended to be primarily historical in nature, providing an overview of the history of medical professionalism. In the second part of the course, we will delve more deeply into the sociology of professions, ending with an exploration of contemporary ways of understanding professionalism in medicine. In the third part of the course, we will delve into several specific, contemporary challenges facing the medical profession and approaches to these challenges. Throughout the course, we will use specific cases as examples to develop and illustrate methods of analysis.

10275 Special Topics in Bioethics. *3 credits.*

This course focuses on topics of special interest in bioethics. Examples of topics include neuroethics, ethics at the end of life, ethical issues in mental health, and political issues in bioethics and public health.

Clinical & Translational Science, Certificate

Program Description

This program is operated by the Clinical and Translational Science Institute (CTSI) of Southeast Wisconsin. The mission of the CTSI is to develop an integrated, shared home for clinical and translational research and to establish a borderless, collaborative, and investigator/ community/patient- friendly, research environment. The CTS Certificate degree program fits with the CTSI's strategic goals of providing quality education and training to cultivate the next generation of clinical and translational researchers.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has no additional specific requirements.

Potential students must apply by July 1st for Fall term enrollment.

Fields of Study

Certificate students will select from the four tracks and complete four classes, or 12 credits. The emphasis tracks include Translational Science, Population Science, Health Systems Science, and Community Based Science.

Translational Science

This track is focused on the foundational principles of the translational process. This “bench-to-bedside” process involves moving discoveries from their basic foundation to clinical settings. Discoveries of focus include diagnostics, therapeutics, medical procedures, and other interventions. Suggested electives for this program include Translational Genomics and Survey of Biomedical Engineering.

Population Science

There are a variety of factors that can influence health outcomes at a population level, and this track will focus on the relationship between these factors, health, and research. This program will focus on factors such as socioeconomic status, health disparities, social determinants of health, healthcare systems, environment, and policies. Suggested electives include Health Economics, Introduction to Statistics using Stata, Regression using Stata, and Health and Medical Geography.

Health System Science

The focus of this track is on principles and processes within the healthcare system. The topics of focus will include delivery of healthcare, how healthcare professionals work together, and improvements that can be made within the system to improve healthcare delivery. Suggested electives for this program include Health Economics, Health and Medical Geography, Dissemination and Implementation Science, and Qualitative and Mixed Methods.

Community Based Science

This track is focused on engaging the community in research being conducted near the end of the translational spectrum. Emphasis is placed on collaboration with community members and organizations to promote engagement in developing community-wide approaches to improve health for all. Suggested electives include Health Disparities, Health and Medical Geography, Dissemination and Implementation Science, and Qualitative and Mixed Methods.

Credits Required to Graduate

12 credits

Required Courses

20101 Introduction to Clinical and Translational Science. *3 credits.*

The goal of this course is to help students understand the foundations of translational science, develop an understanding of the benefits and difficulties associated with translational research, and to understand and evaluate the role of interdisciplinary and team science in translational research. Coursework will include weekly reading of peer-reviewed manuscripts, assignments, and a final project. Weekly classes will include discussion of reading and assignments are designed to allow practice of critically reading and planning translational science projects. The course will meet once per week for a total of 18 weeks.

20160 Foundations in Health Services Research. *3 credits.*

The course will provide the student with a broad understanding of health services research design and methodology, as well as provide the student with the opportunity to engage in a mentored, individualized, in-depth study experience. By the end of the course the student will be able to understand key theories that serve as the foundation of health services research and understand the process of developing a research idea and translating it into an R-series level NIH proposal. Coursework will include weekly reading of peer-reviewed manuscripts, one introductory textbook on health services research, and one introductory textbook on designing clinical research. Weekly classes will include discussion of reading and assignments are designed to allow practice of critically reading and planning health services research projects.

20220 Clinical Statistics I. *3 credits.*

This is an introductory course in evidence discovery that demonstrates the concepts and application of statistical techniques/tools, given the role of statistics as an information science. The course is intended to inform and provide quantitative skills for graduate students interested in undertaking research in clinical medicine, epidemiology, public health, translational and biomedical sciences. This course emphasizes the basic dogma of statistics namely the central tendency theorem as well as sampling as the core of statistics. With the characterization of statistics as descriptive and inferential, the descriptive arm of statistics is stressed in this course namely summary statistics. Basic probability concepts are covered to stress the importance of sampling prior to reliable inference from the sample data. Sample estimation of the population and the precision (confidence interval) are described as well as the hypothesis testing notion in inferential statistics. The parametric and non-parametric methods are introduced with the intent to describe the methods as applicable to continuous (ratio, interval, cardinal) and discrete (categorical binary, dichotomous) data.

Elective Courses

20120 Introduction to Health Disparities Research. *3 credits.*

Emphasis Track suggested for: Community Based Science

The course is an introduction to health disparities. By the end of the course, the student will be able to understand the relationship between inequities in social determinants of health and health outcomes in various populations. Coursework will include weekly readings from one textbook on multicultural medicine and health disparities as well as peer-reviewed articles to demonstrate the concepts in real- world experiences. Weekly classes will include discussion of the readings. Course projects will be assigned and are designed to allow practice of critically reading and appraising the literature related to applied health disparities research and also to understand the theoretical bases for health equity research.

20241 Translational Genomics. *3 credits.*

Emphasis Track suggested for: Translational Science

The primary goal of this course is to teach students how to develop a research program to ask relevant genetic questions in the clinical setting utilizing the molecular genetics toolbox. To this end, students will be provided with background in molecular genetics strategies and study designs as well as an understanding of common genetics questions emanating from the clinic so that they will be better able to make connections between bench and bedside. In addition, they will be challenged to think creatively and through a translational focus during course-long case studies and group projects.

20260 Introduction to Dissemination and Implementation Science. *3 credits.*

Emphasis Track suggested for: Population Science Track

The course is an introduction to dissemination and implementation and science research methods both theoretical and applied. By the end of the course the student will be able to understand the science of dissemination and implementation and applied methods for dissemination and implementation. Coursework will include weekly reading of peer-reviewed manuscripts and one introductory textbook on dissemination and implementation science. Weekly classes will include discussion of reading and course projects are designed to allow practice of critically reading and planning implementation research.

20262 Introduction to Health Economics. *3 credits.*

Emphasis Track suggested for: Health Systems Science

The course is an introduction to health economics both theoretical and applied. By the end of the course the student will be able to understand the basics of health economics including the principles and research methodology used to apply economic concepts to the health field. Coursework will include weekly reading of peer-reviewed manuscripts and one introductory textbook on health care economics. Weekly classes will include discussion of reading and course projects are designed to allow practice of critically reading and conducting health economic research.

Clinical & Translational Science, Master of Science

Program Description

Wisconsin. The mission of the CTSI is to develop an integrated, shared home for clinical and translational research and to establish a borderless, collaborative, and investigator/ community/patient- friendly, research environment. The CTS Master's and Certificate degree programs fit with the CTSI's strategic goals of providing quality education and training to cultivate the next generation of clinical and translational researchers.

The goal of the Master's in Clinical and Translational Science (MSCTS) degree is to train the next generation of health care professionals, clinical investigators, research scientists, and other individuals working in translational research sciences. The curriculum incorporates the full spectrum of the translational continuum (T0 through T5) and provides training and skills to position candidates to be successful in the growing field of Clinical and Translational Science.

Topics covered include foundations of translational research, clinical statistics, epidemiology, ethics and safety, and study designs across the continuum. Candidates seeking a Master's degree will select from one of four emphasis tracks and complete a thesis.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has no additional specific requirements.

Potential students must apply by July 1st for Fall term enrollment.

Fields of Study

Candidates seeking a Master's degree will select from one of four emphasis tracks and complete a thesis. Certificate students will select from the same four tracks and complete 4 classes, or 12 credits. The emphasis tracks include Translational Science, Population Science, Health Systems Science, and Community Based Science.

Translational Science

This track is focused on the foundational principles of the translational process. This “bench-to-bedside” process involves moving discoveries from their basic foundation to clinical settings. Discoveries of focus include diagnostics, therapeutics, medical procedures, and other interventions. Suggested electives for this program include Translational Genomics and Survey of Biomedical Engineering.

Population Science

There are a variety of factors that can influence health outcomes at a population level, and this track will focus on the relationship between these factors, health, and research. This program will focus on factors such as socioeconomic status, health disparities, social determinants of health, healthcare systems, environment, and policies. Suggested electives include Health Economics, Introduction to Statistics using Stata, Regression using Stata, and Health and Medical Geography.

Health System Science

The focus of this track is on principles and processes within the healthcare system. The topics of focus will include delivery of healthcare, how healthcare professionals work together, and improvements that can be made within the system to improve healthcare delivery. Suggested electives for this program include Health Economics, Health and Medical Geography, Dissemination and Implementation Science, and Qualitative and Mixed Methods.

Community Based Science

This track is focused on engaging the community in research being conducted near the end of the translational spectrum. Emphasis is placed on collaboration with community members and organizations to promote engagement in developing community-wide approaches to improve health for all. Suggested electives include Health Disparities, Health and Medical Geography, Dissemination and Implementation Science, and Qualitative and Mixed Methods.

Credits Required to Graduate

36 credits

Required Courses

10226 Regulatory Issues in Human Subject Research Protections. *3 credits.*

There is no question that the fruits of research have fueled medical progress. Yet, the history of research involving human subjects is not unblemished. Federal regulations, based on ethical principles set forth in the Belmont Report, now govern much of the research undertaken in the United States. In this course, we will explore the history and substance of research regulations in the United States, the application of the regulations to specific research issues, and situations where the regulations do not provide clear guidance.

20101 Introduction to Clinical and Translational Science. *3 credits.*

The goal of this course is to help students understand the foundations of translational science, develop an understanding of the benefits and difficulties associated with translational research, and to understand and evaluate the role of interdisciplinary and team science in translational research. Coursework will include weekly reading of peer-reviewed manuscripts, assignments, and a final project. Weekly classes will include discussion of reading and assignments are designed to allow practice of critically reading and planning translational science projects. The course will meet once per week for a total of 18 weeks.

20151 Introduction to Epidemiology. *3 credits.*

This course provides an introduction to the concepts, principles, and research methods specific to epidemiology. Students will learn about population health, how to select appropriate study designs for collecting evidence for medical practice, how to summarize evidence for medical practice and how to translate evidence into medical practice. By the end of the course, students should be able to apply the skills learned to assess the health of a population, describe determinants of health, and select an appropriate study design to evaluate population health. The course will meet once per week for a total of 18 weeks.

20160 Foundations in Health Services Research. *3 credits.*

The course will provide the student with a broad understanding of health services research design and methodology, as well as provide the student with the opportunity to engage in a mentored, individualized, in-depth study experience. By the end of the course the student will be able to understand key theories that serve as the foundation of health services research and understand the process of developing a research idea and translating it into an R-series level NIH proposal. Coursework will include weekly reading of peer-reviewed manuscripts, one introductory textbook on health services research, and one introductory textbook on designing clinical research. Weekly classes will include discussion of reading and assignments are designed to allow practice of critically reading and planning health services research projects.

20220 Clinical Statistics I. *3 credits.*

This is an introductory course in evidence discovery that demonstrates the concepts and application of statistical techniques/tools, given the role of statistics as an information science. The course is intended to inform and provide quantitative skills for graduate students interested in undertaking research in clinical medicine, epidemiology, public health, translational and biomedical sciences. This course emphasizes the basic dogma of statistics namely the central tendency theorem as well as sampling as the core of statistics. With the characterization of statistics as descriptive and inferential, the descriptive arm of statistics is stressed in this course namely summary statistics. Basic probability concepts are covered to stress the importance of sampling prior to reliable inference from the sample data. Sample estimation of the population and the precision (confidence interval) are described as well as the hypothesis testing notion in inferential statistics. The parametric and non-parametric methods are introduced with the intent to describe the methods as applicable to continuous (ratio, interval, cardinal) and discrete (categorical binary, dichotomous) data.

20299 Master's Thesis. *6-9 credits.*

6-9 Master's Thesis credits are required for program completion. All students will complete a Master's thesis describing a translational or clinical research project in which he or she participated in both the design and execution. The Committee will be comprised of a thesis mentor and two additional faculty members (one of whom is a biostatistician). The Committee will approve the project in advance, will provide guidance and supervision of the project, and will critique and, if appropriate, approve the thesis.

20302 Research Seminar. *3 credits.*

The goal of this course is to provide Master's students protected time to develop their thesis questions and to provide students with an opportunity to receive feedback on their thesis project at regular intervals in a structured format. By the end of the course students will be able to develop a research question, conduct a comprehensive literature review, select appropriate methods to answer the research question, and present their findings in written and oral formats. This course will also teach students how to provide constructive criticism and to effectively evaluate the work of their peers. Coursework will include developing a systematic review, providing constructive critiques of the work of other students in the seminar, developing a PowerPoint presentation, and developing a scientific poster presentation. All MS students will be required to take the course. First year Master's students will develop their research question, complete a thorough literature review of the topic of interest in the form of a systematic review, and begin to identify methods that will be used to answer their research question. While second year students will conduct the necessary steps to answer their research question, write their results and conclusions, and prepare an oral presentation of their thesis work to be presented before their colleagues at the end of the semester and during MCW student research day. All students will be expected to provide feedback to their classmates and will receive feedback from their peers and the course director. Each class period four students will present some aspect of their project and will receive feedback from peers and the course director.

Required Courses as Needed

20002 Master's Thesis Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

Elective Courses

14200 Survey of Biomedical Engineering. *3 credits.*

Emphasis Track(s) suggested for: Translational Science

This course is a review of biomedical technologies employed in medicine for the diagnosis, treatment, and prevention of chronic and acute diseases. The goal of the course is to familiarize students with the operating principles, economic aspects of technology use in clinical practice. Over the duration of the course each student will prepare three reports and one lecture on the use of technology in medicine.

18258 Advanced Epidemiological Methods. 3 credits.

Prerequisites: 18201 Principles of Epidemiology or equivalent Department: Public Health Emphasis Track(s) suggested for: Population Science, Health Systems Science

Epidemiologic Methods builds on introductory epidemiology courses by providing a more in depth understanding of fundamental epidemiologic principles presented in introductory epidemiologic courses such as study design and bias. In addition, Epidemiologic Methods emphasizes more advanced concepts needed in establishing causal relationships from observational data. It is particularly relevant to students who intend to conduct studies investigating the occurrence and determinants of diseases or who wish to be sophisticated consumers or critics of epidemiologic research conducted by others. The course emphasizes practical application of Epidemiologic Methods to real world problems.

19210 Health and Medical Geography. 3 credits.

Emphasis Track(s) suggested for: Population Science, Community Based Science

Geography and physical and social environments have important implications for human health and health care. This course will explore the intersections among geography, environments, and public health, with an emphasis on geographical analysis approaches for health data, to address two key questions: (1) How can concepts from geography help us to better understand health and well-being? (2) How can geographic tools, such as Geographic Information Systems (GIS) be used to address pressing questions in health and medical research?

19225 Introduction to Statistics using Stata. 3 credits.

Emphasis Track(s) suggested for: Population Science, Health Systems Science

This course will provide an introduction to the foundations of using Stata for data analysis through an applied format. Statistical analyses covered will include descriptive statistics, univariate and bivariate analysis, and basic regression. Students will become acquainted with the basics of cleaning and organizing datasets, completing descriptive analysis, coding, and interpreting results of univariate and bivariate analyses, as well as linear and logistic regression. By the end of the course students will be able to analyze data independently and interpret results. Coursework will include weekly reading, in-class Stata analyses, and completion of a focused course project developed throughout the semester. Course projects will allow students to develop their skill set and experience independently coding in Stata to complete statistical analyses and interpreting results within the context of strengths and limitations of their data. The final project will also incorporate both literature review and developing a research question that can be analyzed using existing data.

19226 Regression Analysis using Stata. *3 credits.*

Emphasis Track(s) suggested for: Population Science, Health Systems Science

Prerequisites: 19225 Introduction to Statistics using Stata

This course will provide an introduction to the foundation's regression through hands-on training in advanced regression techniques using Stata. Statistical analyses covered will include multiple linear regression, analysis of variance, logistic, polytomous, and ordinal logistic regression, and mixed models. Students will become acquainted with the basics of coding and interpreting results of regression analyses, as well as diagnostics to confirm correct model fit. By the end of the course students will be able to conduct regression analyses independently and interpret results. Coursework will include weekly reading, in-class Stata analyses, and completion of a focused course project developed throughout the semester. Course projects will allow students to develop their skill set independently coding in Stata to complete statistical analyses and interpreting results within the context of strengths and limitations of each test. The final project will also incorporate both literature review and developing a research question that can be analyzed using existing data.

19230 Qualitative and Mixed Methods. *3 credits.*

Emphasis Track(s) suggested for: Community Based Science

Qualitative and mixed methods can be highly useful in the conduct of community-based population health research. This course will provide introductory classroom and field-based learning experience in qualitative and mixed methods research. Students will receive training in the design, implementation, analysis, and synthesis of qualitative and mixed methods. Emphasis will be given to the appropriate uses of commonly used methods in community-based health research. Course participation will provide students with the basic foundation necessary to develop a research study using qualitative or mixed method designs. This course is for graduate students in the doctoral degree program for Public and Community Health.

20120 Introduction to Health Disparities Research. *3 credits.*

Emphasis Track(s) suggested for: Community Based Science

The course is an introduction to health disparities. By the end of the course, the student will be able to understand the relationship between inequities in social determinants of health and health outcomes in various populations. Coursework will include weekly readings from one textbook on multicultural medicine and health disparities as well as peer-reviewed articles to demonstrate the concepts in real-world experiences. Weekly classes will include discussion of the readings. Course projects will be assigned and are designed to allow practice of critically reading and appraising the literature related to applied health disparities research and also to understand the theoretical bases for health equity research.

20241 Translational Genomics. *3 credits.*

Emphasis Track(s) suggested for: Translational Science

The primary goal of this course is to teach students how to develop a research program to ask relevant genetic questions in the clinical setting utilizing the molecular genetics toolbox. To this end, students will be provided with background in molecular genetics strategies and study designs as well as an understanding of common genetics questions emanating from the clinic so that they will be better able to make connections between bench and bedside. In addition, they will be challenged to think creatively and through a translational focus during course-long case studies and group projects.

20260 Introduction to Dissemination and Implementation Science. *3 credits.*

Emphasis Track(s) suggested for: Health Systems Science, Community Based Science

The course is an introduction to dissemination and implementation and science research methods both theoretical and applied. By the end of the course the student will be able to understand the science of dissemination and implementation and applied methods for dissemination and implementation. Coursework will include weekly reading of peer-reviewed manuscripts and one introductory textbook on dissemination and implementation science. Weekly classes will include discussion of reading and course projects are designed to allow practice of critically reading and planning implementation research.

20262 Introduction to Health Economics. *3 credits.*

Emphasis Track(s) suggested for: Population Science, Health Systems Science

The course is an introduction to health economics both theoretical and applied. By the end of the course the student will be able to understand the basics of health economics including the principles and research methodology used to apply economic concepts to the health field. Coursework will include weekly reading of peer-reviewed manuscripts and one introductory textbook on health care economics. Weekly classes will include discussion of reading and course projects are designed to allow practice of critically reading and conducting health economic research.

20265 Clinical Quality Improvement. *3 credits.*

In the spectrum of Clinical translational research an important but often overlooked component is the ability to implement and maximize the utilization of evidence-based practice. This involves skills in process improvement and change management that overlap with but extend beyond the traditional clinical research and development. This course would serve as an important complement to other aspects of translational research for those who interests are in the "real life" implementation of clinical research.

Community Health Assessment and Planning, Certificate

Program Description

fulfill their educational goals. The program focuses on individuals who have responsibility and accountability for the health of the populations they serve. This certificate will provide the training to competently assess, plan for improvement, and monitor the health of various populations. Coursework consists of two required courses and two elective courses for a total of 12 credits. All credits offered in the certificate program may be transferable to the Master of Public Health program within one year of certificate completion.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

One to two years of experience working in health care, worksite wellness, or public health strongly recommended.

Credits Required to Graduate 12 credits

Required Courses

This course covers the central concepts of community health assessment and improvement. Students will review public health concepts from a public health systems and practice perspective. The course will focus on public health essential services 1 and 2. Students will obtain an understanding of the public health system, community health assessment and the health improvement process using selected frameworks. The course will focus in-depth on learning about the Mobilizing for Action through Planning and Partnerships (MAPP) frameworks and application of selected components to course projects. In addition, this course will provide the foundation for future community health planning and evaluation courses by building on the content of the public health administration course using a public health practice perspective.

18230 Community Health Program Planning. *3 credits.*

Builds on the foundation in health improvement program planning obtained in the Public Health Administration and Community Assessment and Improvement courses. This course will increase the depth and breadth of students' knowledge and skills through a theoretical and application-based curriculum through three modules, including strategic planning, program planning, and leadership competencies to lead planning efforts.

Elective Courses

18115 Health Promotion and Disease Prevention. *3 credits.*

Students will learn key concepts through readings, lectures, on-line discussions and written exercises. The latter will allow students to practice designing elements of an HP/DP plan for a population and health problem of their own choosing using each of the theoretical models and techniques presented in the course. This course is an elective in the MPH degree program, the Certificate in Community Health Assessment & Planning program, and the Certificate in Population Health Management program.

18223 Public Health Policy. *3 credits.*

This course will meet the need of MCW MPH students to know and understand the fundamentals of public health policymaking by diverse stakeholders in the process. The course fills gaps in the curricula at MCW. The textbook is Bodenheimer and Grumbach, *Understanding Health Policy: a Clinical Approach*, 6th edition, Lange publisher. Each session has educational objectives and a competency goal, readings and possible videos, a recorded audio slide presentation by faculty, and a discussion question for students addressing the conflicts and challenges in policy development.

18241 Health Communication. *3 credits.*

This course is designed to explore the ways that communication impacts people's health and wellbeing, as well as their understanding of health-related topics. The course will cover multiple levels of communication, different communication channels, and the use of diverse communication media and technologies.

18260 Community Health Program Evaluation. *3 credits.*

The Community Health Program Evaluation course examines the basic topics related to Community Health Program Evaluation including the history of program evaluation; the levels of program evaluation process; qualitative and quantitative measures; data management tools; data analysis methods; quality management; and other contextual issues surrounding program evaluation. This course will incorporate the use of assigned readings, group projects, peer evaluation, online discussions, and exams in order to foster knowledge of material presented in the course, as well as application-based learning in the area of evaluation of community health.

Genetic Counseling, Master of Science

Program Description

This program offers a Master of Science degree in Genetic Counseling, through the Medical College of Wisconsin Graduate School. The program is a full-time, day program with one cohort of 10 students beginning each fall term. The duration is 21 months in length, consisting of four fall/spring terms with one intervening summer term session. The program curriculum consists of 56 term credits, including coursework, clinical practicums, and a research thesis. Students who successfully complete the program will be eligible for the American Board of Genetic Counseling (ABGC) certification examination.

The Genetic Counseling Master of Science Program at the Medical College of Wisconsin will prepare the next generation of genetic counselors to be diverse leaders at the forefront in the delivery of precision health.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Applicants must have a bachelor's degree. Although a specific major is not required, most applicants have a degree in a biological or social science (e.g., biology, genetics, biochemistry, sociology, social work).

A minimum undergraduate grade-point average (GPA) of 3.00 or a master's degree with a minimum cumulative GPA of 3.00 is required. If a student has an undergraduate GPA less than 3.0, coursework completed after graduation demonstrating a higher GPA will be considered.

Prerequisites listed below must be completed with a grade of C or better, prior to the program start date. Applications will still be considered with coursework pending. College credit for high school Advanced Placement courses do not satisfy the requirement.

Prerequisite course work includes one semester each of the following:

- Genetics
- Statistics
- Biochemistry
- Social Science

An applicant must complete courses in biochemistry, statistics, genetics, and a social science (such as psychology, sociology, women's studies, philosophy, ethnic studies, etc.). We encourage students to take as many courses as possible relevant to genetic counseling to strengthen their application. All required courses should be taken prior to applying as it is difficult to evaluate courses "in progress" at the time of application.

For additional information pertaining to the admissions process and requirements, we encourage you to check out the [MSGC Program Website](#).

Credits Required to Graduate 56 credits

Required Courses

20241 Translational Genomics. *3 credits*.

The primary goal of this course is to teach students how to develop a research program to ask relevant genetic questions in the clinical setting utilizing the molecular genetics toolbox. To this end, students will be provided with background in molecular genetics strategies and study designs as well as an understanding of common genetics questions emanating from the clinic so that they will be better able to make connections between bench and bedside. In addition, they will be challenged to think creatively and through a translational focus during course-long case studies and group projects.

40110 Bioethics in Precision Medicine. *3 credits*.

This course will explore the historical, philosophical, rhetorical, and ethical foundations of precision medicine and analyze the bioethical issues raised by this new medical paradigm as they manifest in a variety of clinical, biomedical, and health policy context.

40130 Human Development and Prenatal Genetics. *2 credits*.

Students will be introduced to the various aspects of prenatal genetics including normal and abnormal pregnancy and fetal development. Students will become familiar with genetic testing and screening options that are used to investigate risk for genetic conditions in pregnancy and appropriate clinical applications of these tests. Using maternal, familial, and fetal factors, population data, and genetic screening and testing results, students will formulate personalized risk assessments. Topics such as infertility, pregnancy loss, termination, and other pregnancy management options will be explored. Students will appreciate the psychosocial elements specific to prenatal genetic counseling and continue to develop skills in presenting information in a balanced manner.

40140 Cancer Genomics. *2 credits*.

This course will familiarize students with hereditary cancer syndromes and the underlying causes of cancer. The interdisciplinary care of cancer patients will also be explored through case-based study. Students will gain knowledge of various cancer risk assessment models and genetic testing options. Students will incorporate genetic test results with personal and family history information to create a personalized risk assessment for a variety of indications. Students will learn to appreciate different psycho-social considerations affecting families with cancer.

40145 Medical Genomics. *3 credits.*

This course aims to familiarize students with a medical genetics evaluation typical to what would be seen in the pediatric or adult genetics clinic. Students will appreciate the interprofessional collaboration required for the diagnosis and management of children and adults with complex disease. Students will be introduced to a plethora of genetic conditions spanning multiple disease categories. A differential diagnosis and genomic testing plan will be formulated using information gathered from thorough chart review, birth, family, and developmental histories, and the physical exam. Students will be able to determine the clinical significance of genetic testing results.

40150 Genetic Counseling I: Skills and Practice. *2 credits.*

Students will be introduced to the history and evolution of the genetic counseling profession. Students will be oriented to fundamental genetic counseling skills including pedigree construction, pedigree analysis, case preparation, contracting, documentation and risk assessment. Students will begin to consider legal, ethical, social and cultural issues related to genetic counseling and be encouraged to explore their own values and biases. Development and adaptation of oral and written communication skills to various audiences will be applied through course assignments and case-based learning. Students will be introduced to professional issues such as credentialing, professional development and lifelong learning.

40155 Genetic Counseling II: Theory and Practice. *2 credits.*

This course prepares students to conduct a full genetic counseling session including case preparation, facilitation of session components and follow-up. Students will expand upon their interviewing skills develop case conceptualization ability and hone their patient education skills. Through standardized patients and in class role play, students will learn to recognize psychosocial aspects of the genetic counseling session and apply their counseling skills. Students will engage in course activities to further develop their communication abilities (oral and written), apply advanced risk assessment, and examine professional boundaries. Students will have the opportunity to enhance personal skill development through the giving and receiving of feedback with peers and supervisors.

40156 Genetic Counseling III: Psychosocial Issues. *2 credits.*

This course builds on Genetic Counseling 2: Theory and Practice by further exploring psychological aspects of the genetic counseling process. Students will learn to apply counseling theories in the development of their clinical communication skills. Students will learn to integrate client factors including cultural, socioeconomic, emotional, behavioral, gender, and educational status into the genetic counseling session. Students will develop more advanced techniques to address the psychosocial impact of a genetic condition on the family, complex family dynamics and unique issues that may occur in genetic counseling. Continued professional development will be emphasized by exploration of personal strengths, limitations, values, and biases as they relate to genetic counseling.

40157 Genetic Counseling IV: Advanced Topics. *2 credits.*

This course will prepare students for life beyond the classroom with a focus on honing skills needed to become an independent successful genetic counselor. Students will develop an appreciation for the growth of the genetic counselling field and for life-long learning inherent in the profession. Discussion of current and emerging topics will put students in a position to become leaders in the field. As future practitioners in their communities, students will appreciate the scope and complex nature of health disparities and embrace cultural humility. In addition, students will also develop habits to build resilience necessary for personal growth and self-care.

40160 Research Methodologies & Informatics. *2 credits.*

This course is designed to build a foundation to help students formulate and execute their research thesis topics. Students will learn about a variety of research methodologies, including quantitative and qualitative approaches. As part of this course, students will gain experience identifying and critically reviewing scientific literature and get exposure to the use of informatics tools. They will learn to evaluate research hypotheses and identify various aspects of the research process, including study design, data management and analysis. Throughout this course there will be an emphasis on conducting research responsibly, ethically, and with integrity. We will highlight various opportunities that genetic counselors have for research involvement. This introductory course aims to instill the value of research as it applies to the practice of genetic counseling, and its implications for the community.

40203 Molecules to Cells for Genetic Counselors. *3 credits.*

This course is designed to provide students with necessary background knowledge in cell biology, molecular genetics, biochemistry, and embryology as it pertains to clinical genetics. There will be emphasis on the clinical relevance of these topics and how abnormalities in these cellular processes can lead to human disease. In addition, students will be introduced to different genetic and biochemical testing and screening options that are commonly used to diagnose genetic disorders.

40293, 40295, 40296, 40297, 40298 Clinical Practicum I-V. *3 credits.*

The overall goal of clinical practicums is to develop genetic counseling skills, acquisition of the genetic counseling practice-based competencies, prepare students to enter the workforce, and be able to operate successfully in a variety of different roles and specialties. The clinical practicums will be facilitated by the Director of Fieldwork Training and will be based on curriculum schedule along with clinical supervisor and clinic schedule. Students are required to complete five clinical rotations with the program. There are 4 clinical specialty placements and 1 elective rotation. The core clinical placements are in pediatrics, prenatal, oncology, and other adult specialty. Throughout the practicum, students will apply their knowledge in a supervised clinical setting and will participate in clinical cases. Each Clinical Practicum will consist of 16 total clinic days (8 hours per day) under the supervision of a certified genetic counselor under a specific area of practice.

Students may begin to document participatory cases in their logbook in this practicum. Students will be expected to progress from beginning level of proficiency to intermediate and advanced levels in as many domains as possible within the practiced-based competencies as defined by the Accreditation Counseling for Genetic Counseling. These students will train in clinical settings in a developmental fashion to acquire a set of skills to become competent in all aspects of genetic counseling. They will be expected to spend 8-hour days in clinical sites unless other arrangements have been made or approved by clinical supervisors. The rotation is planned with the primary clinical supervisor. Students will receive formal evaluation throughout the practicum by their supervisors at 2 different time points throughout the rotation with their primary supervisors as well as the Director of Fieldwork Training. They will establish goals for each rotation and expectations alongside their clinical supervisor to help them attain growth towards the practice-based competencies. Students will also participate in various case conferences and tumor boards as part of their supplemental fieldwork experiences.

40294 Laboratory Practicum. *3 credits.*

The purpose of the laboratory practicum is to introduce students to the many different types of tests involved in clinical as well as research genetics, to start to develop the skills necessary to understand and communicate genetic testing strategies and results, and to encourage students to think about the roles genetic counselors can play in the testing process. This practicum will function as a “rotation” with students moving through different experiences in small groups. The practicum will expose students to different molecular, cytogenetic, and biochemical tests and help them develop an understanding for how these tests are performed and when they are appropriate. Students will have the opportunity to see how an individual sample moves from the point of collection through the laboratory and ultimately into a research or clinical report for several specific testing modalities, helping them to think about how to explain the testing process to patients, providers, and other audiences. Students will also learn about how genetic testing has changed over time and how genetics professionals adapt to those changes. Finally, students will be encouraged to explore the different ways genetic counselors are involved in the testing process through interviews, field trips, and other experiences.

40299 Genetic Counseling Research Thesis. *1-3 credits.*

Thesis credits are required for program completion. The culminating experience for students in the MCW MS Genetic Counseling Program is a formal thesis research project focused on the practice of genetic counseling in which she or he participated in the design, execution, data analysis, and write-up. Working on the research thesis allows students to develop skills that enhance intellectual development and critical, flexible thinking. Our research program is driven by the interests of the individual student and takes advantage of the wide variety of genomics initiatives across our MCW community and the state of Wisconsin. The timeline for the thesis project begins in the Fall of the first year in the Research Methodologies & Informatics Course when students identify a research question they are interested in studying, complete a comprehensive literature review on the subject, and identify a thesis advisor(s). Continuation of the research process happens within this Research Thesis Course throughout the rest of the Program. Students will secure a Thesis Committee comprised of their primary thesis advisor (Committee Chair) and two additional faculty members.

The Committee will approve the project in advance, will provide guidance and supervision of the project, and will critique and approve the final thesis. Students present their results in local and regional forums, including the Genetic Counseling Colloquium in the final semester of the Program near graduation, and are strongly encouraged to submit their findings as abstracts to regional or national conferences, and for publication.

40301 Genetic Counseling Seminar. *1 credit.*

This course promotes lifelong education for the profession of genetic counselling through exposure to interdisciplinary events and engagement in community activities. Students will give effective presentations tailored to a variety of audiences. Students will identify community engagement opportunities to promote a deeper understanding of patient experience.

Required Courses as Needed

40002 Research Thesis Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

Notes

MSGC Curriculum Overview

<i>1st Year</i>		<i>2nd Year</i>	
<i>Fall Term</i>		<i>Fall Term</i>	
Molecules to Cells for GCs	3	Bioethics in Precision Medicine	3
GC1: Skills & Practice	2	GC3: Psychosocial Issues	2
Research Methods & Informatics	2	GC Seminar	1
GC Seminar	1	Clinical Practicum II (8 weeks)	3
Laboratory Practicum	3	Clinical Practicum III (8 weeks)	3
Total Term Credits	11	Research Thesis	2
		Total Term Credits	14
<i>Spring Term</i>		<i>Spring Term</i>	
Human Development & Prenatal Genetics	2	GC4: Advanced Topics	2
GC2: Theory & Practice	2	GC Seminar	1
Translational Genomics	3	Clinical Practicum IV (8 weeks)	3
Cancer Genomics	2	Clinical Practicum V (8 weeks)	3
GC Seminar	1	Research Thesis	3
Research Thesis	1	Total Term Credits	12
Total Term Credits	11		
<i>Summer Term</i>			
Medical Genomics	3		
Clinical Practicum I (8 weeks)	3		
Research Thesis	2		
Total Term Credits	8		

Global Health Equity, Master of Science

Program Description

The Master of Science in Global Health Equity program at the Medical College of Wisconsin was created to meet the growing demand of global health professionals. Our small cohorts make it possible for local and intentional mentoring from faculty who have a wide range of global health experience. Students will conduct a global health project with one of our local or international partners. Our flexible, interactive program allows students to choose from a variety of elective courses to gain expertise in areas they are most interested in. Full-time and part-time study are allowed.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Students should have a strong foundation in quantitative, behavioral, and biological sciences

Credits Required to Graduate 36 credits

Required Courses

29219 Introduction to Global Health Equity. *3 credits.*

The Centers for Disease Control and Prevention have reported that ten great public health achievements worldwide in the last decade have been their science and programmatic role in global health including the prevention of HIV/AIDS, tuberculosis control, access to safe water and sanitation, control of neglected tropical disease, reductions in child mortality, vaccines, malaria prevention and control, and tobacco control. In seeking to address and understand complex global health concerns, the MS GHE Program is uniquely positioned to enlist multidisciplinary faculty to present the world's burden of disease and propose solutions to decrease health disparities. A focused approach to local and global health issues adds value to public health professionals' roles. As the United States becomes increasingly more globally diverse, there is a growing need to understand and serve the global populations in our own neighborhoods and communities. By training our future public health professionals to be culturally sensitive and world thinkers they can better understand the unique distinctions each culture brings.

29220 Statistics for Global Health. *2 credits.*

This course will provide a foundation for statistical analysis in global health research using Stata software. First, we will cover research design and data collection, including questionnaire design, sample selection, sampling weights and data cleaning. Second, we will emphasize the use of code or command files in Stata to ensure that students are taught how to write programs. Third, the students will learn how to describe statistical results for technical and non-technical audiences. The students will be introduced to univariate, bivariate, logistic regression, and linear regression analyses. The students learn to formulate a research question that addresses a sustainable developmental goal, analyze data using existing international data sets, and interpret the results. They will learn to present their results to the scientific community as well as to local communities and will prepare a final research paper.

29230 Epidemiologic Research Methods in Global Health Equity. *2 credits.*

This course was developed specifically for the Master of Science in Global Health Equity Students. This course will tie the application of Epidemiology to Global Health and develop student's knowledge and skills in developing a research question, conducting literature reviews, analyzing data and succinctly communicating a research project in written and oral formats. This will be a required course for MS GHE students and will be a foundational base for future course work as well as the student's final thesis work project and paper.

29236 Digital Storytelling for Public Health. *1 credit.*

The translational aspects of Public Health sciences require creative approaches to stakeholder engagement, communication, and trust building. Digital storytelling has become recognized methodology to build relationships for community engagement as well as generate useful qualitative data. The latter are particularly useful for developing cultural context in health communication. This course will provide an overview of how indie filmmaking techniques can be used to efficiently produce digital stories. We will also present examples of how this process facilitates community (stakeholder) engagement for research projects.

29239 Ethics and Global Health. *3 credits.*

This course will be in the intersection between bioethics, global public health, and international biomedical research and practice. It will look at global health issues and their ethical challenge from the perspective of culturally diversity communities and their local experience related to health and health care. This course engages in a debate of the main ethical issues of clinical practices in health care and research institutions and health care actions in global health. It aims to provide students resources and practical skills to handle ethical dilemmas and lead decision making processes in clinical contexts, related to research with human subjects, healthcare delivery, and public health policies. To achieve this goal, this course is divided into two parts: First, it examines the foundational structures of bioethics, letting them to be challenged by pluralistic worldviews. Second, it discusses ethical dilemmas and concrete clinical situations in which students are challenged to lead decision-making processes in order to deal with moral stress and to address ethical dilemmas, at the same time that high ethical standards are considered. In addition, participants will be exposed to firsthand data from ethnographic and participatory action research in global health and challenged to read authors that show especial consideration for the voices and experiences of vulnerable and historical marginalized populations.

29275 Global Health Consulting and Research Methods. *3 credits.*

This course is an applied, project-focused, “real-world” overview for individuals in healthcare consulting. Students will learn about planning, executing, and evaluating research that is applicable to advising with respect to relevant needs to help organizations serve their stakeholders more effectively, efficiently, and efficaciously. This course provides you with an introduction to a range of established and emerging consultancy practices such as design thinking, open innovation and sourcing, stakeholder journey mapping, and agile methodology.

29279 Thesis Work Preparatory Course. *1 credit.*

Experiences in global health have proven to be invaluable in shaping the interests and careers of students. Participation in global health educational and research activities is associated with increased likelihood of addressing health disparities and the social determinants of health. However, there are also potential pitfalls associated with sending students to research arenas in which they are unfamiliar- processes are different, the resources available for research may be limited, there are language and cultural barriers, and students face safety issues pertaining to travel and occupational exposures. This type of experience is a means for professionals-in-training to learn important lessons about health disparities and cultural diversity. This course will provide a step-by-step guide to prepare students for successful thesis work.

29299 Master's Thesis. *6 credits.*

Thesis work is a required component of the MS in Global Health Equity program. It is a planned, supervised, and evaluated practical experience designed to enhance and complement the educational training. Students will engage in research or a community engagement project. Students are encouraged to choose a thesis placement that aligns with their career interests. Global and local placements are available with MCW's established partners.

Required Courses as Needed

29002 Thesis Work Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

Elective Courses

29100 Community Health Needs Assessment. *2 credits.*

Understanding the health needs of communities is central to the success of programs designed to address the most pertinent health challenges of vulnerable communities. Participants will get an understanding of why community health needs assessments are necessary. They will delve into the steps taken in designing, conducting, and analyzing the findings of a health needs assessment, with a focus on rural communities in developing country settings. They will get insights on the types of data needed for a health needs assessment and the indicators used for this type of assessment in the context of rural communities in low-income country settings.

29110 Introduction to Chronic Diseases in Global Health. *2 credits.*

This course will provide an introduction to chronic disease. The major groups of chronic diseases that will be discussed in this course include cardiovascular disease, cerebrovascular disease, major forms of cancer, diseases of the respiratory tract, metabolic and digestive diseases, musculoskeletal diseases, and neurodegenerative diseases. Specifically, it will describe the major causes of chronic disease morbidity and mortality around the world, and how the risk of disease varies with regions. It will discuss major public health efforts to reduce disparities in chronic health around the world. Students will have the opportunity to develop country reports on specific chronic diseases, reports of global and public health efforts within those countries, as well as demonstrate the ability to identify opportunities for specific health interventions and create evidence-based programs aimed at chronic diseases with a focus on cultural values, integration of community assets and resources, and utilization of the expertise of identified global health professional and groups with similar interests.

29150 Global Environmental Health. *3 credits.*

Global Environmental Health will examine environmental problems that manifest at a global scale, with implications for human health and health equity. This course provides (1) a survey of major global environmental issues impacting human health, and (2) a focused examination of global climate change, related health impacts, and approaches to environmental sustainability, mitigation, and resilience. Issues to be considered include urbanization, air quality, water and sanitation, energy, food systems, biodiversity, waste, drivers of emerging diseases, climate change, and green infrastructure. The course will consider relevant social, economic, and political factors and approaches to controlling or eliminating risks. We will apply a global health equity perspective, examining causes and effects of environmental issues and implications for vulnerable populations. Environmental health issues in both developed and developing countries will be presented.

29160 Infectious Disease Epidemiology. *2 credits.*

This course addresses the epidemiological, clinical, and practical issues important to the study of infectious diseases of public health significance. The epidemiology of selected infectious diseases commonly occurring nationally or internationally, or of potential use as a bioterrorism weapon, will be discussed in detail. Subjects discussed include immunizations, microbiology tools for the epidemiologist, nosocomial infections, outbreak epidemiology and emerging infectious diseases.

29165 Ethics in Qualitative Research. *2 credits.*

This course examines ethical considerations beyond regulatory approval. Together, we assist in laying a foundation in ethical qualitative research practices as well as considering ethical treatment of special populations, and the development/evolution of one's own ethical stance.

29235 Fragile Lives: Understanding Vulnerability in Old Age. *2 credits.*

In bioethics, vulnerability is a very important concept along with ethical principles such as autonomy, justice, beneficence, integrity, and dignity. The notion is an integral part of several international ethical and legal guidelines such as the Nuremberg Code and the Belmont report which aimed to protect the vulnerable from inhuman medical practices. Despite being at the heart of bioethical inquiry, the concept of vulnerability has no clear-cut definition. Vulnerable populations are generally believed to include (but are not limited to) minors, incapacitated adults, prisoners, institutionalized individuals, minorities, refugees, nomads, homeless persons, unemployed, poor persons, pregnant women, women, and older persons. This labeling approach to vulnerability has been strongly criticized in the bioethics literature for being broad and thus lacks discrimination of individual and situation differences.

29237 Researching, Analyzing and Profiling Global Health TIPS1. *2 credits.*

This course grows students' awareness of and engagement with significant, urgent, and uncertain global healthcare (HC) issues and policies, with an emphasis on their equity considerations and outcomes. This course provides data and evidence-driven "real-world" contexts and applications. Students will examine subject matter areas that their research has the highest potential of producing valued guests (i.e., analyzing data and translating evidence and science into policy) for stakeholders, especially HC organizational leaders, practitioners, and policymakers.

Practical knowledge will be developed in conducting issues research and policy analysis, shaping different briefs and communicating findings for leadership audiences, developing partnerships, promoting, and implementing evidence based interventions. Lastly, it aims to connect how students can help move data and evidence-based insights about problems toward desired actions and improvement of health and medical practices.

29238 Global Health Initiatives. *2 credits.*

Global Health Initiatives (GHIs) such as the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund), the President's Emergency Plan for AIDS Relief (PEPFAR), and the World Health Organization (WHO) among others, have been instrumental in the rapid acceleration of programs targeting specific diseases such as HIV, TB, malaria, malnutrition, maternal and child health in low- and middle-income countries (LMIC). At the same time, other non-communicable diseases such as cancer, mental health, substance use, diabetes and cardiovascular disease have been relatively neglected in LMICS, even as the global burden such diseases create is growing. The purpose of this course is to critically examine the GHIs' roles in addressing public health emergencies and the effects of these efforts on the health care system and health of populations living in LMICs.

The first part of the course provides an overview of the major political, financial, and social structural organizations involved in global health policy. These include international development and financial organizations and institutions, national governments, nongovernmental organizations rooted in civil society, and private sector entities. In the second half of the course students explore specific case studies in global health policy that illustrate policymaking and implementation successes and challenges.

29240 Multicultural Mental Health Guidelines in Native American Populations. *3 credits.*

This course is designed to familiarize students with essential, and largely Pan-cultural information about the mental health issues facing the First Nations populations of North America. First Nations persons include those also generally referred to as American Indians, Alaska Natives, and Native American Indians. Demographic, historical, sociopolitical, and inter- and intra-ethnic contexts critical to understanding the First Nations will be addressed. Specific knowledge constructs such as historical context, identity formation, acculturation, enculturation, language, family and community values, religion and spirituality. Traditional beliefs about health and illness, gender role socialization, and social class are emphasized. Attention will be given to contemporary issues facing the First Nations that influence service delivery and the receipt of care. Culturally relevant interventions are presented.

29245 Health and Forced Migration. *2 credits.*

Introduction to displaced populations and refugee health with special attention to vulnerable populations; the intersection of human rights, health policy, and health systems; and the health consequences of forced migration. This course will describe some aspects of the causes for populations to flee their homelands, common ways refugee camps are set up and structured, frequently seen health effects of displaced populations, specific vulnerable sub-groups within displaced populations, and the legal and ethical challenges of the displaced. This course is suitable to anyone interested in the effects of forced migration on population health.

29250 How to Build Health Research Partnerships with Native American Communities. *2 credits.*

Working with Native American communities to conduct health research presents unique challenges. Many of these challenges align with community-based participatory research principles. However, the unique socio-political context of Native American tribal groups requires that health professionals reach beyond standard best practices. This course will provide the contextual information to navigate cultural competency, historical distrust, and government-to-government policy necessary to build durable health research partnerships with Native American groups.

29295 Readings and Research. *1-2 credits.*

This is an independent study course; the student is to independently conduct research in their chosen thesis topic. The number of credits selected by the student determines the number of hours per week that must be dedicated to working on the Readings and Research plan. The student is responsible for finding a faculty member who is willing to work with the student; together they will establish learning goals, deliverables, resources, timeline, and mechanism for feedback.

29325 Global Maternal and Child Health. *2 credits.*

Global Maternal and Child health is an essential elective to the MS Global Health Equity program as maternal and child health is a large field in which many students have interest in pursuing as a career. The course instructor has specific expertise in this field and will provide as well-rounded perspective of global maternal and child health issues. The current curriculum does not offer a course on this topic, this course is an essential addition to the program.

Electives offered at Marquette University:

5461 Comparative Health Politics and Policy. *3 credits.*

7150 Outbreaks, Epidemics and Pandemics. *3 credits.*

Healthcare Technologies Management, Master of Science

Program Description

The Healthcare Technologies Management program is a collaborative effort between Marquette University and the Medical College of Wisconsin that combines management, technology, and health care. The objective of the program is to educate professionals capable of managing the design, development, commercialization and regulatory compliance of diagnostic and therapeutic medical devices, and the implementation, utilization, and assessment of hospital-based healthcare

technologies. Learn more [here](#).

Interdisciplinary Program in Biomedical Sciences

Program Description

The Interdisciplinary Program in Biomedical Sciences (IDP) is committed to providing a broad and integrated education in biomedical science. This education is designed to serve the students well as they move on to pursue specialized research projects. During the first year, students take a core curriculum designed to provide a foundation in biochemistry, cell biology, genetics, molecular biology, physiology, signaling, laboratory techniques, and biostatistics. Students also take 4-6 credits of elective courses and a summer manuscript writing course to help better prepare them for their chosen field of interest. Finally, students take courses in Professional Development which provides students the opportunity to gain experience in various scientific activities and exposes them to important concepts like diversity and inclusion.

Students also explore their individual research interests through four laboratory rotations that emphasize experimental design and integration into a research team. Students are encouraged to take advantage of the diversity of opportunities in the six participating departments. Once a student selects a dissertation advisor, they become affiliated with one of the following graduate programs: Biochemistry; Biophysics; Cell and Developmental Biology; Microbiology and Immunology; or Pharmacology and Toxicology; or Physiology. In addition, students may also pursue a clinical focus if admitted into the Basic and Translational Science Program. Additional information about individual departmental programs is given elsewhere in this publication.

During their second year of studies, students take a course in writing an NIH-style fellowship and prepare and defend a proposal based on their own research that provides them with valuable experience in mastering a scientific problem, formulating a suitable hypothesis, and drafting a feasible and productive experimental scheme with which to test it. Successful completion of this qualifying exam is a major step towards being admitted to candidacy for a PhD degree in one of the participating departments. During their second semester and in subsequent years, students are also expected to successfully complete a number of advanced courses selected with the guidance of their dissertation mentor, dissertation committee, and the Graduate Program Director of their affiliated department. Upper-level students focus on the development of their research skills, performance of their doctoral research, and completion of their dissertation. Once affiliated with a particular laboratory and department, students can expect attentive personal mentoring by their dissertation advisor. Throughout their graduate careers, students in the Interdisciplinary Program continue to meet as a group to share ideas, insights, and research accomplishments with each other and with the faculty.

This program prepares students for advanced study in one of the following PhD degree-granting programs: [Biochemistry](#); [Biophysics](#); [Cell and Developmental Biology](#); [Microbiology and Immunology](#); and [Pharmacology and Toxicology](#).

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Successful applicants will show undergraduate achievement in science and mathematics courses and have prior research experience.

Fields of Study

Faculty participating in the Interdisciplinary Program in Biomedical Research have diverse research interests such as:

- Cancer Biology
- Cardiovascular Biology
- Cell Biology & Signaling
- Developmental Biology
- Drug Discovery
- Enzymology & Metabolism
- Free Radical Biology
- Gene Expressions and epigenetics
- Inflammation & Immunology
- Microbial Infection & Pathogenesis
- Microbiome
- Molecular Genetics
- Molecular Pharmacology & Toxicology

Neuroscience (Cellular and Molecular)

- Physiological Sciences
- Stem Cell Biology & Regenerative Medicine
- Structural Biology
- Technology Development

Required Courses

16215 Foundations in Biomedical Sciences I. *3 credits.*

16211,16212, 16213, 16214 Introduction to Biomedical Research I-IV. *1 credit each.*

This course reflects student's participation in laboratory research rotations and their attendance at seminars and/or journal clubs.

16215 Foundations in Biomedical Sciences I. *3 credits.*

This new course will be a didactic based course that will provide the background for understanding the biochemical basis of life. Students will learn about thermodynamic principles that drive biochemical and enzymatic reactions, protein structure and protein dynamics and the thermodynamic principles that define these structures and their interactions with other biomolecules, the principles that define their functional activities and then an application of this knowledge to an understanding of metabolic pathways. Students will also learn how foundational biochemical principles apply to certain physiological settings in health and disease and how pharmacological intervention can modulate physiological responses. The format of the course involves lectures and review sessions which are designed to promote class discussion of the relevant material.

16216 Foundations in Biomedical Sciences II. *3 credits.*

This is an interdisciplinary course that provides students with a foundation in the areas of gene expression, and basic and contemporary cell biology. The material is primarily presented in lecture format, but significant number of discussion sections and data interpretation discussions are also included. Students are expected to gain fundamental knowledge in the areas of gene regulation, translational and posttranslational control and cellular architecture.

16217 Foundations in Biomedical Sciences III. *3 credits.*

Module III builds on the cell biology fundamentals introduced in the latter part of Modules I and II. This course starts with three lectures on cell signaling and a discussion of a primary research article on the topic. This forms the basis of Exam 1. The second part focuses on proteins specialized for ion flux and transport. Themes are exemplified by case studies on several diseases that affect either epithelial transport or excitable cells. Exam 2 captures this material. The third and last part of the course focuses on DNA homeostasis, genetic principals, the basis of stem cells and cancer. Exam 3 closes out the Fall semester.

16218 Foundations in Biomedical Science IV. *3 credits.*

This course is designed to give students fundamental introductory concepts impacting the fields of Microbiology and Immunology, Neurobiology and Pharmacology in three modules. Topics were selected and the three modules integrated based on the essential concept that human biological responses and development are shaped by chemical cues. The impact on human biology from contact or colonization with microorganisms and the innate and adaptive immune responses to contact are discussed in the first module. Module 2 focuses on the physiological aspects of how signals are perceived and interpreted by the human nervous system. Module 3 communicates fundamental aspects of pharmacology, emphasizing the molecular and cellular levels of signaling and signal transduction. Each session was designed to incorporate current analytical methods, computational and statistical aspects of data analysis and clinical or practical impacts on human health and disease.

16242 Techniques in Molecular and Cellular Biology. *2 credits.*

The primary objective for this course is to provide information and conceptual knowledge of a number of the most common techniques required for biomedical research. The information presented in this course should facilitate comprehension of the scientific literature and introduce procedures that students will commonly use in their research projects. The lecture materials will present the theory behind each technique, the practical limitations of each technique and the questions that each technique addresses. Additional lectures will assist the student in use bioinformatics and biostatistics methods and in preparing results for publication.

The course emphasizes the following core competencies: biomedical knowledge of a variety of commonly used research techniques, research skills through understanding published literature and experimental design, critical and creative thinking through the ability to judge information in the literature related to the techniques covered, interpersonal and communication skills through class participation and discussion and written exams, professionalism by interacting respectfully with others in the class, arriving to class on time and being prepared to participate, and lifelong learning by developing new learning and independent thinking skills.

16245 Statistics for Basic Sciences. *1 credit.*

This course is designed to provide graduate students working in the research laboratory or studying the experimental sciences with fundamental knowledge in biostatistics. It focuses on descriptive statistics, elements of probability theory, estimation, tests of hypotheses, methods of categorical data tabulation and analysis. After completion of the course, students should be able to develop an appropriate study plan to explore a biomedical research question and execute simple statistical analysis of the data collected in the study. Emphasis is placed on understanding concepts as well as learning to apply the covered statistical techniques. Students also learn how to read, interpret, and critically evaluate statistical concepts in the literature.

16290 Professional Development I. *1 credit.*

Emphasis in this course will be placed on oral and written communication, critical literature review, and responsible conduct in research. Students will learn good practices for peer review and perform interactive exercises to review each other's work.

16291 Professional Development II. *1 credit.*

Professional Development follows a multidisciplinary approach to promote individual career development in the biomedical sciences. The course includes lectures, discussion, sessions, seminars, and hands-on activities. Topics of particular emphasis are oral and written communication and rigor and ethics in scientific research.

16292 Writing a Scientific Paper. *1 credit.*

This course will present a step-by-step approach to putting together a scientific paper. Students will be divided into groups of 3, and these groups will stay together for the duration of the course. Each group will be given an identical set of data with which to compose a manuscript. Each week, a different aspect of paper writing will be discussed, and students will be given a take home assignment to write that particular component of the paper within the small groups. In the final week of the class, the finished papers will be peer reviewed by 2 other groups and a member of the faculty. The course will be graded on attendance, successful and timely completion of the assignments and evaluation of the final manuscript.

16293 Writing an Individual Fellowship. *2 credits.*

This course provides a systematic approach towards writing a F31-like individual research fellowship. Topics include the organization of the NIH, how the NIH invites investigators to submit applications to support their doctoral studies, how PhD trainees and their mentors respond to these invitations, and how the NIH reviews a fellowship application. A weekly didactic session will be presented to the entire group of students who will have weekly individual writing assignments to complete and will have a weekly small group session to share their progress towards the completion of their writing assignments. Each student will identify a mentor-approved research topic that will be developed into a fellowship proposal, emphasizing the writing of a Summary, Specific Aims Page, and Research Plan as outlined in PA-19-195 and SF-424(F).

Elective Courses

16265 Introduction to Organ Systems Physiology. *2 credits.*

Introduction to Organ Systems Physiology is a first-year elective course that focuses on the classic topics in physiology – the science of regulation and control systems – including the Physiology of Cells, Muscle, Cardiovascular, Pulmonary, Renal, GI, Endocrine, and Reproduction. It also introduces students to animal models in physiological research appropriate for the topic at hand.

16266 Bacterial Diversity and the Microbiome. *1 credit.*

This interdisciplinary course provides students with a solid foundation in the molecular and physiological basis of bacterial diversity with a particular focus on those organisms that comprise the gut microflora. The interaction between bacteria and viruses or phages is also highlighted. The course will be paper based with chalk-talk style discussion sessions designed to promote discussion of the literature.

16267 Protein Chemistry: Applications. *1 credit.*

Suitable for all students interested in developing critical thinking skills through literature examples of protein activity and its regulation. Students and instructors discuss literature that illustrates the in vitro reconstitutions, proteins structure/activity, and methods and logic of experimental design including critical control experiments. In addition, discussions include methods learned in the first-year curriculum that might have been applied but were not. From these analyses, students hone their critical thinking and communication skills.

16268 Protein Chemistry: Principles. *1 credit.*

Suitable for all students interested in developing critical thinking skills through literature examples of protein activity and its regulation. In this course, students and instructors use the primary literature to learn and apply the practical formalisms in protein chemistry – including thermodynamics, kinetics, enzymology, and chemical biology – to the regulation of protein activity. Biology is governed by thermodynamic and kinetic principles, but these principles are often abstract to students. The purpose of this course is for students to develop utility in thermodynamic and kinetic principles and apply them to biological systems. The course emphasizes literature examples and expect students to learn these principles by working through problem sets provided by instructors. Students are able to differentiate when thermodynamics or kinetics likely govern a given biological system and have a framework by which to analyze new systems. In addition, discussions include methods learned in the first year curriculum that might have been applied but were not.

16269 Basic Immunology. *1 credit.*

The purpose of this course is to introduce basic concepts in immunology through lectures, readings from texts and current journals. The course is geared toward students interested in contemporary concepts of cellular and molecular immunology. The course has been designed to integrate fundamental concepts in immunology with the goal of students being able to understand and critically evaluate the complex nature of immune interactions and immune dysfunction regardless of their specific research focus. The participating faculty are from diverse backgrounds with unique expertise. Students learn fundamental concepts in immunology with topics including innate and adaptive immunity, the cellular basis of the immune response, antigens presentation and antibodies, molecular basis for generating immunologic diversity, and regulation of immune responses. In the final block of the course, students integrate their knowledge of the immune system and apply it to disease.

16270 Integrated Microbiology and Immunology. *3 credits.*

The purpose of this course is to introduce basic and integrated concepts in immunology and cellular microbiology through lectures, readings from texts and current journals. The course is geared toward first year students matriculating into the Microbiology and Immunology (MI) Graduate Program as well as any student interested in contemporary concepts of cellular microbiology, immunology, and host-pathogen interactions. The course has been designed to integrate fundamental concepts in immunology and microbiology with the goal of students being able to understand and critically evaluate the complex nature of host pathogen interactions and immune dysfunction regardless of their specific research focus. Students learn fundamental concepts in immunology and gain an appreciation of the basic properties of bacteria and virus structure, replication, and pathogenesis. In the final block of the course, students integrate their knowledge of pathogens and the immune system.

16271 Fundamentals of Neuroscience. *3.5 credits.*

Fundamentals of Neuroscience follows a multidisciplinary approach to current knowledge about the structural and functional properties of the nervous system. The mechanisms of the nervous system are described at the molecular, cellular, systems and complex brain function levels. The course includes in-class lectures, seminars from prominent scientists (video archives), and written assignments. The purpose of this course is to introduce 1st year graduate students to the structure and function of the human nervous system.

16272 Graduate Neuroanatomy. *0.5 credit.*

Graduate Neuroanatomy is a lab-based course intended to accompany MCW course Fundamentals of Neuroscience. The purpose of this course is to introduce 1st year PhD students to the anatomy of the human nervous system.

16273 Advanced Cell Biology. *3 credits.*

Advanced Cell Biology is an upper level, 3-credit hour cell biology elective course that focuses on a variety of advanced topics in contemporary Cell Biology. Students gain an in depth understanding of specific selected topics through the use of a variety of resources including webinars and podcasts, detailed in-class discussion of papers from the scientific literature and through preparation and presentation of a lecture on a cell biological topic directly relevant to the student's own research interests. Lectures by faculty are minimized.

16274 Metabolism. *1 credit.*

This course is mainly a didactic based course that comprehensively reviews subjects important to metabolism. The topics covered range from carbohydrate metabolism to oxidative phosphorylation to lipid and amino acid metabolism. There is a strong focus of these topics in health and disease, especially as they related to the cardiovascular system, cancer, diabetes, and immune system function. The depth of coverage within each topic is not necessarily comprehensive, but there may be a few aspects of each topic that are highlighted by focusing on landmark studies or recent developments from published articles. In addition, the discussions include methods learned in the first-year curriculum that might have been applied but were not.

16275 Understanding Cell Signaling through Therapeutic Drugs. *2 credits.*

This course presents advanced concepts in cellular signaling by analyzing the molecular mechanisms responsible for the therapeutic benefit, unanticipated toxicity, and limited effectiveness of particularly well-known drugs that target specific signal transduction pathways. The topics are designed to promote an enhanced understanding of the complexities of multiple signaling pathways, and a sophisticated appreciation of how these pathways are integrated to produce cellular responses.

The course has a translational emphasis by focusing on the multiple molecular actions of current FDA-approved drugs, as well as discontinued drugs that were removed from the market due to unanticipated toxicity or limited effectiveness. The lectures provide an advanced analysis of the molecular responses that led to the success or failure of these drugs, encouraging students to develop sophisticated analytical skills that allow them to define how different signaling pathways are integrated. Lectures presented by instructors provide an in-depth overview of different signaling pathways, and manuscript discussions promote additional advanced analysis that creatively engages the students.

16276 Developmental and Stem Cell Biology. *3 credits.*

This course provides a detailed introduction to Developmental and Stem Cell Biology. The course uses an advanced graduate style format including lectures, in class paper discussions, and departmental seminars from experts in the field. Students prepare and present a lecture on a developmental and stem cell biology topic directly relevant to each student's own research interests. Students also provide feedback to their peers in the form of brief critiques of individual presentations.

16277 Cognitive Neuroscience. *1 credit.*

Cognitive neuroscience examines human brain information processing at the level of large-scale neurobiological systems. Some examples include information processing that underlies learning and retrieving concepts, comprehending, and producing language, directing, and maintaining attention, and recognizing sensory objects. Each session in this course begins with a 1-hour contextual lecture, followed by review and discussion of two relevant landmark papers, sometimes with opposing views. Emphasis is placed on understanding the processing models central to each domain, the extent to which these models are supported by empirical evidence from neuroimaging, and the relevance of the field to a variety of human brain disorders.

16278 Functional Genomics. *3 credits.*

This course will use a variety of didactic lecture, paper discussions, and hands-on bioinformatics learning to provide students with fundamentals in genomics, transcriptomics, proteomics, genetic manipulation, epigenetics, protein modeling and molecular simulation. Theory, practical applications, and analysis methods will be taught.

Interdisciplinary Program in Neuroscience

Program Description

The Interdisciplinary Program in Biomedical Sciences (IDP) is committed to providing a broad and integrated education in biomedical science. This education is designed to serve the students well as they move on to pursue specialized research projects. During the first year, students take a core curriculum designed to provide a foundation in biochemistry, cell biology, genetics, molecular biology, physiology, signaling, laboratory techniques, and biostatistics. Students also take 4-6 credits of elective courses and a summer manuscript writing course to help better prepare them for their chosen field of interest. Finally, students take courses in Professional Development which provides students the opportunity to gain experience in various scientific activities and exposes them to important concepts like diversity and inclusion.

Students also explore their individual research interests through four laboratory rotations that emphasize experimental design and integration into a research team. Students are encouraged to take advantage of the diversity of opportunities in the six participating departments. Once a student selects a dissertation advisor, they become affiliated with one of the following graduate programs: Biochemistry; Biophysics; Cell and Developmental Biology; Microbiology and Immunology; or Pharmacology and Toxicology; or Physiology. In addition, students may also pursue a clinical focus if admitted into the Basic and Translational Science Program. Additional information about individual departmental programs is given elsewhere in this publication.

During their second year of studies, students take a course in writing an NIH-style fellowship and prepare and defend a proposal based on their own research that provides them with valuable experience in mastering a scientific problem, formulating a suitable hypothesis, and drafting a feasible and productive experimental scheme with which to test it. Successful completion of this qualifying exam is a major step towards being admitted to candidacy for a PhD degree in one of the participating departments. During their second semester and in subsequent years, students are also expected to successfully complete a number of advanced courses selected with the guidance of their dissertation mentor, dissertation committee, and the Graduate Program Director of their affiliated department. Upper-level students focus on the development of their research skills, performance of their doctoral research, and completion of their dissertation. Once affiliated with a particular laboratory and department, students can expect attentive personal mentoring by their dissertation advisor. Throughout their graduate careers, students in the Interdisciplinary Program continue to meet as a group to share ideas, insights, and research accomplishments with each other and with the faculty.

This program prepares students for advanced study in one of the following PhD degree-granting programs: [Biochemistry](#); [Biophysics](#); [Cell and Developmental Biology](#); [Microbiology and Immunology](#); [Physiology](#); and [Pharmacology and Toxicology](#).

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Successful applicants will show undergraduate achievement in science and mathematics courses and have prior research experience.

Fields of Study

Faculty participating in the Neuroscience Doctoral Program have diverse research interests such as:

- Neurodegeneration and Neurotrauma

Neurodegenerative diseases including ALS, Parkinson's Disease and Spinal Cord Injury are studied using stem cells, animal models, and human tissues.

- Neuroimaging, Tissue to Brain

State of the art brain imaging is used to study language, vision, hearing, learning and memory, and brain diseases including cancer.

- Cellular and Synaptic Communication

Neuronal Communication at the cellular level is studied using cutting-edge genetic and electrophysiological tools in order to dissect mechanisms of development and disease in the visual system, learning and memory, and addiction

- Function of Neural Systems in Normal and Disease states

Sleep disruption, breathing, chronic stress, reward and drug abuse systems, hearing, touch and temperature sensation and chronic pain.

Required Courses

16211,16212, 16213, 16214 Introduction to Biomedical Research I-IV. *1 credit each.*

This course reflects student's participation in laboratory research rotations and their attendance at seminars and/or journal clubs.

16215 Foundations in Biomedical Sciences I. *3 credits.*

This new course will be a didactic based course that will provide the background for understanding the biochemical basis of life. Students will learn about thermodynamic principles that drive biochemical and enzymatic reactions, protein structure and protein dynamics and the thermodynamic principles that define these structures and their interactions with other biomolecules, the principles that define their functional activities and then an application of this knowledge to an understanding of metabolic pathways. Students will also learn how foundational biochemical principles apply to certain physiological settings in health and disease and how pharmacological intervention can modulate physiological responses. The format of the course involves lectures and review sessions which are designed to promote class discussion of the relevant material.

16216 Foundations in Biomedical Sciences II. *3 credits.*

This is an interdisciplinary course that provides students with a foundation in the areas of gene expression, and basic and contemporary cell biology. The material is primarily presented in lecture format, but significant number of discussion sections and data interpretation discussions are also included. Students are expected to gain fundamental knowledge in the areas of gene regulation, translational and posttranslational control and cellular architecture.

16217 Foundations in Biomedical Sciences III. *3 credits.*

Module III builds on the cell biology fundamentals introduced in the latter part of Modules I and II. This course starts with three lectures on cell signaling and a discussion of a primary research article on the topic. This forms the basis of Exam 1. The second part focuses on proteins specialized for ion flux and transport. Themes are exemplified by case studies on several diseases that affect either epithelial transport or excitable cells. Exam 2 captures this material. The third and last part of the course focuses on DNA homeostasis, genetic principals, the basis of stem cells and cancer. Exam 3 closes out the Fall semester.

16218 Foundations in Biomedical Science IV. *3 credits.*

This course is designed to give students fundamental introductory concepts impacting the fields of Microbiology and Immunology, Neurobiology and Pharmacology in three modules. Topics were selected and the three modules integrated based on the essential concept that human biological responses and development are shaped by chemical cues. The impact on human biology from contact or colonization with microorganisms and the innate and adaptive immune responses to contact are discussed in the first module. Module 2 focuses on the physiological aspects of how signals are perceived and interpreted by the human nervous system. Module 3 communicates fundamental aspects of pharmacology, emphasizing the molecular and cellular levels of signaling and signal transduction. Each session was designed to incorporate current analytical methods, computational and statistical aspects of data analysis and clinical or practical impacts on human health and disease.

16242 Techniques in Molecular and Cellular Biology. *2 credits.*

The primary objective for this course is to provide information and conceptual knowledge of a number of the most common techniques required for biomedical research. The information presented in this course should facilitate comprehension of the scientific literature and introduce procedures that students will commonly use in their research projects. The lecture materials will present the theory behind each technique, the practical limitations of each technique and the questions that each technique addresses. Additional lectures will assist the student in use bioinformatics and biostatistics methods and in preparing results for publication.

The course emphasizes the following core competencies: biomedical knowledge of a variety of commonly used research techniques, research skills through understanding published literature and experimental design, critical and creative thinking through the ability to judge information in the literature related to the techniques covered, interpersonal and communication skills through class participation and discussion and written exams, professionalism by interacting respectfully with others in the class, arriving to class on time and being prepared to participate, and lifelong learning by developing new learning and independent thinking skills.

16245 Statistics for Basic Sciences. *1 credit.*

This course is designed to provide graduate students working in the research laboratory or studying the experimental sciences with fundamental knowledge in biostatistics. It focuses on descriptive statistics, elements of probability theory, estimation, tests of hypotheses, methods of categorical data tabulation and analysis. After completion of the course, students should be able to develop an appropriate study plan to explore a biomedical research question and execute simple statistical analysis of the data collected in the study. Emphasis is placed on understanding concepts as well as learning to apply the covered statistical techniques. Students also learn how to read, interpret, and critically evaluate statistical concepts in the literature.

16290 Professional Development I. *1 credit.*

Emphasis in this course will be placed on oral and written communication, critical literature review, and responsible conduct in research. Students will learn good practices for peer review and perform interactive exercises to review each other's work.

16291 Professional Development II. *1 credit.*

Professional Development follows a multidisciplinary approach to promote individual career development in the biomedical sciences. The course includes lectures, discussion, sessions, seminars, and hands-on activities. Topics of particular emphasis are oral and written communication and rigor and ethics in scientific research.

16292 Writing a Scientific Paper. *1 credit.*

This course will present a step-by-step approach to putting together a scientific paper. Students will be divided into groups of 3, and these groups will stay together for the duration of the course. Each group will be given an identical set of data with which to compose a manuscript. Each week, a different aspect of paper writing will be discussed, and students will be given a take home assignment to write that particular component of the paper within the small groups. In the final week of the class, the finished papers will be peer reviewed by 2 other groups and a member of the faculty. The course will be graded on attendance, successful and timely completion of the assignments and evaluation of the final manuscript.

16293 Writing an Individual Fellowship. *2 credits.*

This course provides a systematic approach towards writing a F31-like individual research fellowship. Topics include the organization of the NIH, how the NIH invites investigators to submit applications to support their doctoral studies, how PhD trainees and their mentors respond to these invitations, and how the NIH reviews a fellowship application. A weekly didactic session will be presented to the entire group of students who will have weekly individual writing assignments to complete and will have a weekly small group session to share their progress towards the completion of their writing assignments. Each student will identify a mentor-approved research topic that will be developed into a fellowship proposal, emphasizing the writing of a Summary, Specific Aims Page, and Research Plan as outlined in PA-19-195 and SF-424(F).

Elective Courses

16265 Introduction to Organ Systems Physiology. *2 credits.*

Introduction to Organ Systems Physiology is a first-year elective course that focuses on the classic topics in physiology – the science of regulation and control systems – including the Physiology of Cells, Muscle, Cardiovascular, Pulmonary, Renal, GI, Endocrine, and Reproduction. It also introduces students to animal models in physiological research appropriate for the topic at hand.

16266 Bacterial Diversity and the Microbiome. *1 credit.*

This interdisciplinary course provides students with a solid foundation in the molecular and physiological basis of bacterial diversity with a particular focus on those organisms that comprise the gut microflora. The interaction between bacteria and viruses or phages is also highlighted. The course will be paper based with chalk-talk style discussion sessions designed to promote discussion of the literature.

16267 Protein Chemistry: Applications. *1 credit.*

Suitable for all students interested in developing critical thinking skills through literature examples of protein activity and its regulation. Students and instructors discuss literature that illustrates the in vitro reconstitutions, proteins structure/activity, and methods and logic of experimental design including critical control experiments. In addition, discussions include methods learned in the first-year curriculum that might have been applied but were not. From these analyses, students hone their critical thinking and communication skills.

16268 Protein Chemistry: Principles. *1 credit.*

Suitable for all students interested in developing critical thinking skills through literature examples of protein activity and its regulation. In this course, students and instructors use the primary literature to learn and apply the practical formalisms in protein chemistry – including thermodynamics, kinetics, enzymology, and chemical biology – to the regulation of protein activity. Biology is governed by thermodynamic and kinetic principles, but these principles are often abstract to students. The purpose of this course is for students to develop utility in thermodynamic and kinetic principles and apply them to biological systems. The course emphasizes literature examples and expect students to learn these principles by working through problem sets provided by instructors. Students are able to differentiate when thermodynamics or kinetics likely govern a given biological system and have a framework by which to analyze new systems. In addition, discussions include methods learned in the first year curriculum that might have been applied but were not.

16269 Basic Immunology. *1 credit.*

The purpose of this course is to introduce basic concepts in immunology through lectures, readings from texts and current journals. The course is geared toward students interested in contemporary concepts of cellular and molecular immunology. The course has been designed to integrate fundamental concepts in immunology with the goal of students being able to understand and critically evaluate the complex nature of immune interactions and immune dysfunction regardless of their specific research focus. The participating faculty are from diverse backgrounds with unique expertise. Students learn fundamental concepts in immunology with topics including innate and adaptive immunity, the cellular basis of the immune response, antigens presentation and antibodies, molecular basis for generating immunologic diversity, and regulation of immune responses. In the final block of the course, students integrate their knowledge of the immune system and apply it to disease.

16270 Integrated Microbiology and Immunology. *3 credits.*

The purpose of this course is to introduce basic and integrated concepts in immunology and cellular microbiology through lectures, readings from texts and current journals. The course is geared toward first year students matriculating into the Microbiology and Immunology (MI) Graduate Program as well as any student interested in contemporary concepts of cellular microbiology, immunology, and host-pathogen interactions. The course has been designed to integrate fundamental concepts in immunology and microbiology with the goal of students being able to understand and critically evaluate the complex nature of host pathogen interactions and immune dysfunction regardless of their specific research focus. Students learn fundamental concepts in immunology and gain an appreciation of the basic properties of bacteria and virus structure, replication, and pathogenesis. In the final block of the course, students integrate their knowledge of pathogens and the immune system.

16271 Fundamentals of Neuroscience. *3.5 credits.*

Fundamentals of Neuroscience follows a multidisciplinary approach to current knowledge about the structural and functional properties of the nervous system. The mechanisms of the nervous system are described at the molecular, cellular, systems and complex brain function levels. The course includes in-class lectures, seminars from prominent scientists (video archives), and written assignments. The purpose of this course is to introduce 1st year graduate students to the structure and function of the human nervous system.

16272 Graduate Neuroanatomy. *0.5 credit.*

Graduate Neuroanatomy is a lab-based course intended to accompany MCW course Fundamentals of Neuroscience. The purpose of this course is to introduce 1st year PhD students to the anatomy of the human nervous system.

16273 Advanced Cell Biology. *3 credits.*

Advanced Cell Biology is an upper level, 3-credit hour cell biology elective course that focuses on a variety of advanced topics in contemporary Cell Biology. Students gain an in depth understanding of specific selected topics through the use of a variety of resources including webinars and podcasts, detailed in-class discussion of papers from the scientific literature and through preparation and presentation of a lecture on a cell biological topic directly relevant to the student's own research interests. Lectures by faculty are minimized.

16274 Metabolism. *1 credit.*

This course is mainly a didactic based course that comprehensively reviews subjects important to metabolism. The topics covered range from carbohydrate metabolism to oxidative phosphorylation to lipid and amino acid metabolism. There is a strong focus of these topics in health and disease, especially as they related to the cardiovascular system, cancer, diabetes, and immune system function. The depth of coverage within each topic is not necessarily comprehensive, but there may be a few aspects of each topic that are highlighted by focusing on landmark studies or recent developments from published articles. In addition, the discussions include methods learned in the first-year curriculum that might have been applied but were not.

16275 Understanding Cell Signaling through Therapeutic Drugs. *2 credits.*

This course presents advanced concepts in cellular signaling by analyzing the molecular mechanisms responsible for the therapeutic benefit, unanticipated toxicity, and limited effectiveness of particularly well-known drugs that target specific signal transduction pathways. The topics are designed to promote an enhanced understanding of the complexities of multiple signaling pathways, and a sophisticated appreciation of how these pathways are integrated to produce cellular responses. The course has a translational emphasis by focusing on the multiple molecular actions of current FDA-approved drugs, as well as discontinued drugs that were removed from the market due to unanticipated toxicity or limited effectiveness.

The lectures provide an advanced analysis of the molecular responses that led to the success or failure of these drugs, encouraging students to develop sophisticated analytical skills that allow them to define how different signaling pathways are integrated. Lectures presented by instructors provide an in-depth overview of different signaling pathways, and manuscript discussions promote additional advanced analysis that creatively engages the students.

16276 Developmental and Stem Cell Biology. *3 credits.*

This course provides a detailed introduction to Developmental and Stem Cell Biology. The course uses an advanced graduate style format including lectures, in class paper discussions, and departmental seminars from experts in the field. Students prepare and present a lecture on a developmental and stem cell biology topic directly relevant to each student's own research interests. Students also provide feedback to their peers in the form of brief critiques of individual presentations.

16277 Cognitive Neuroscience. *1 credit.*

Cognitive neuroscience examines human brain information processing at the level of largescale neurobiological systems. Some examples include information processing that underlies learning and retrieving concepts, comprehending, and producing language, directing, and maintaining attention, and recognizing sensory objects. Each session in this course begins with a 1-hour contextual lecture, followed by review and discussion of two relevant landmark papers, sometimes with opposing views. Emphasis is placed on understanding the processing models central to each domain, the extent to which these models are supported by empirical evidence from neuroimaging, and the relevance of the field to a variety of human brain disorders.

16278 Functional Genomics. *3 credits.*

This course will use a variety of didactic lecture, paper discussions, and hands on bioinformatics learning to provide students with fundamentals in genomics, transcriptomics, proteomics, genetic manipulation, epigenetics, protein modeling and molecular simulation. Theory, practical applications, and analysis methods will be taught.

Medical Doctor/Master of Public Health Dual Degree Program

Program Description

This online program gives students who have been accepted to the Medical School at MCW the opportunity to complete the MD and MPH degrees in five years. Combining medical and public health education provides students with interdisciplinary skills needed to serve as leaders to address population-level issues that impact health at local, national, and global levels. With a focus on public health practice, students will find great value in working with others in the community to prevent disease and improve health. Those graduating with the MD/MPH are uniquely prepared for a wide array of careers addressing the health of individuals and populations.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

M1 course grades will also be used in the MPH acceptance decision

Prospective students must apply to both the MCW Medical and Graduate Schools. Students must apply first to the Medical School, be accepted, and matriculate at the MCW Milwaukee campus. Application to the Graduate School occurs in the spring of the M1 year. Enrollment is contingent upon:

1. Achieving a grade of Pass, Satisfactory, or better in all courses during their M1 year
2. Completing all courses without withdrawing from any courses
3. Approval by the Academic Standing and Professionalism Committee
4. Earning satisfactory pathway grades and satisfying all pathway deadlines in a timely Manner

Credits Required to Graduate 42 credits (MPH)

Required Courses

18155 Public Health Theory & Practice. *3 credits.*

This course provides an overview of various theories in public health, as well as, how public health theories can be applied in individual, interpersonal, and community settings. The course will highlight various factors that contribute to public health, including biological, family, ethnic and cultural, and community stressors that affect health and well-being. The course will provide an overview of translating research into public health practice.

18160 Racial and Ethnic Inequalities in Health. *3 credits.*

Recommended: General Epidemiology and Basic Biostatistics.

This course will provide students with an in-depth introduction to health disparities and health inequities as they pertain to specific populations in the US that have been historically disadvantaged and systematically deprived of opportunities to achieve optimal health. The course material will also include an overview of social determinants of population health. We will: (i) consider historical and contemporary debates in conceptualizing race and ethnicity, (ii) examine the burden of racial and ethnic disparities in the US, (iii) identify and examine some of the social determinants of health of health and drivers of health inequity and (iv) examine theoretical and practical challenges of developing innovative strategies to eliminate health disparities and achieve health equity.

18165 Principles of Public Health Data and Epidemiology. *3 credits.*

This course examines public health data and epidemiological concepts, including foundations of epidemiology, practical applications of public health data and epidemiology, core measures in public health, descriptive epidemiology, sources of data, study designs and data analysis, communicating data, informatics, disease transmission and prevention, morbidity and mortality, screening tests, infectious disease causation, environmental health, and social, behavioral, and psychosocial epidemiology.

The course emphasizes practical application of concepts and skills learned related to accessing, analyzing, and communicating public health data. The course provides the student with an understanding of the distribution and determinants of health and disease in population groups. The course provides the foundation for many other courses in the MPH program.

18203 Public Health Administration. *3 credits.*

Public health professionals require administrative skills at many levels, from managing personnel and health programs, to making and advocating for organizational and policy decisions regarding the distribution of society's scarce public health resources. This is a survey course designed to introduce 1) the structure, functions, and financing of public health within the context of the U.S. healthcare system and its health policies; 2) the planning, implementation, management, and evaluation of programs to improve health; and 3) principles of effective finance, budgeting, grant-writing, and management strategies. In addition to tutorials, readings and case studies, students will complete assignments that are aligned with their own communities, organizations, and professional roles.

18204 Public Health Analytics. *3 credits.*

The use of descriptive and analytical statistics in research studies, with an emphasis on understanding statistical reports and judging the appropriateness of statistical applications reported in the literature. Calculations of statistics are included as a means to understand the appropriate use of statistics.

18209 Community Health Assessment and Improvement. *3 credits.*

Recommended: 18203 Public Health Administration

This course covers the central concepts of community health assessment and improvement. Students will review public health concepts from a public health systems and practice perspective. The course will focus on public health essential services 1 and 2. Students will obtain an understanding of the public health system, community health assessment and the health improvement process using selected frameworks. The course will focus in-depth on learning about the Mobilizing for Action through Planning and Partnerships (MAPP) frameworks and application of selected components to course projects. In addition, this course will provide the foundation for future community health planning and evaluation courses by building on the content of the public health administration course using a public health practice perspective.

18223 Public Health Policy. *3 credits.*

This course will meet the need of MCW MPH students to know and understand the fundamentals of public health policymaking by diverse stakeholders in the process. The course fills gaps in the curricula at MCW. The textbook is Bodenheimer and Grumbach, *Understanding Health Policy: a Clinical Approach*, 6th edition, Lange publisher. Each session has educational objectives and a competency goal, readings and possible videos, a recorded audio slide presentation by faculty, and a discussion question for students addressing the conflicts and challenges in policy development.

18230 Community Health Program Planning. *3 credits.*

Recommended: 18203 Public Health Administration and 18209 Community Health Assessment and Improvement.

Builds on the foundation in health improvement program planning obtained in the Public Health Administration and Community Assessment and Improvement courses. This course will increase the depth and breadth of students' knowledge and skills through a theoretical and application-based curriculum through three modules, including strategic planning, program planning, and leadership competencies to lead planning efforts.

18260 Community Health Program Evaluation. *3 credits.*

The Community Health Program Evaluation course examines the basic topics related to Community Health Program Evaluation including the history of program evaluation; the levels of program evaluation process; qualitative and quantitative measures; data management tools; data analysis methods; quality management; and other contextual issues surrounding program evaluation. This course will incorporate the use of assigned readings, group projects, peer evaluation, online discussions, and exams in order to foster knowledge of material presented in the course, as well as application-based learning in the area of evaluation of community health.

18268 Leadership for the Public's Health. *3 credits.*

Prerequisites: 18203 Public Health Administration. For students with limited public health experience, 18209 Community Health Assessment and Improvement is recommended as a prerequisite.

The course takes a broad look at leadership within public health practice. An introduction to theoretical and evidence-based research is applied to a wide range of public health challenges. Learners will apply knowledge and personal experiences to newly focused leadership understanding through application to practice. Leadership theory and research will connect to core public health practices of assessment, policy development and assurance.

18279 Field Placement Preparation. *1 credit.*

Prerequisites: 18165 Principles of Public Health Data and Epidemiology, 18203 Public Health Administration, 18204 Public Health Analytics, 18155 Public Health Theory and Practice; all required coursework in the Master of Public Health program besides 18280 Field Placement and 18297 MPH Capstone Project recommended.

This course provides the foundation for the MPH Field Placement course, a required culminating experience within the MPH program. In the Preparation course, students will connect with public health organizations and arrange their specific Field Placement project. The course will highlight principles of human subject research as well as community academic partnerships and will help students apply these principles in the development of their project.

18280 Field Placement. *1-5 credits.*

Prerequisites: All required coursework in the Master of Public Health program besides 18297 MPH Capstone Project recommended.

This is a planned, supervised and evaluated applied practice experience that is designed to enhance and complement the student's educational training by providing practical experience in public or private organizations that address significant public health issues. Working with a site preceptor and faculty advisor, students will develop at least two products for an organization that demonstrate public health competency attainment and are relevant to their professional area of interest.

18297 Capstone Project. *3 credits.*

Prerequisites: All other MPH coursework.

The Capstone Project or Integrative Learning Experience is a culminating experience that requires the students to synthesize and integrate knowledge acquired in coursework and other learning experiences and apply theory and public health principles in the development of a master's paper on significant public or community health issue or topic.

Elective Courses

18115 Health Promotion and Disease Prevention. *3 credits.*

Students will learn key concepts through readings, lectures, on-line discussions and written exercises. The latter will allow students to practice designing elements of an HP/DP plan for a population and health problem of their own choosing using each of the theoretical models and techniques presented in the course. This course is an elective in the MPH degree program, the Certificate in Community Health Assessment & Planning program, and the Certificate in Population Health Management program.

18150 Public Health Law and Ethics. *3 credits.*

The Public Health Law & Ethics course examines law as a tool for public health as well as the ethics underlying the practice of public health and how they interact with the ethical principle of justice, which underlies all of law. The course explores law and ethics in public health through readings related to governmental authority with respect to population and the conflict that it can create with individuals' rights. The course focuses on inadequacies of and changes to the law as revealed by the COVID-19 pandemic and the need to realign public health and the law with the ethics of health justice and equity.

18209 Community Health Assessment and Improvement. *3 credits.*

Recommended: 18203 Public Health Administration

This course covers the central concepts of community health assessment and improvement. Students will review public health concepts from a public health systems and practice perspective. The course will focus on public health essential services 1 and 2. Students will obtain an understanding of the public health system, community health assessment and the health improvement process using selected frameworks. The course will focus in-depth on learning about the Mobilizing for Action through Planning and Partnerships (MAPP) frameworks and application of selected components to course projects. In addition, this course will provide the foundation for future community health planning and evaluation courses by building on the content of the public health administration course using a public health practice perspective.

18215 Infectious Diseases. *3 credits.*

Emphasizes the practice of public health in the following areas of infectious diseases: surveillance, outbreak investigation and control, and prevention and policy.

18230 Community Health Program Planning. *3 credits.*

Recommended: 18203 Public Health Administration and 18209 Community Health Assessment and Improvement.

Builds on the foundation in health improvement program planning obtained in the Public Health Administration and Community Assessment and Improvement courses. This course will increase the depth and breadth of students' knowledge and skills through a theoretical and application-based curriculum through three modules, including strategic planning, program planning, and leadership competencies to lead planning efforts.

18260 Community Health Program Evaluation. *3 credits.*

The Community Health Program Evaluation course examines the basic topics related to Community Health Program Evaluation including the history of program evaluation; the levels of program evaluation process; qualitative and quantitative measures; data management tools; data analysis methods; quality management; and other contextual issues surrounding program evaluation. This course will incorporate the use of assigned readings, group projects, peer evaluation, online discussions, and exams in order to foster knowledge of material presented in the course, as well as application-based learning in the area of evaluation of community health.

18232 Introduction to Population Health Management. *3 credits.*

Provides knowledge and builds competencies to improve population health outcomes as well as patient and provider experiences and to reduce per person costs; themes include leadership in teams, care of populations, health service quality and value, data analysis and reporting, and financial management; competencies include leadership and interprofessional communication, systems thinking, social and behavioral sciences, data management, process and outcome improvement, and policy advocacy.

18241 Health Communication. *3 credits.*

This course is designed to explore the ways that communication impacts people's health and wellbeing, as well as their understanding of health-related topics. The course will cover multiple levels of communication, different communication channels, and the use of diverse communication media and technologies.

18295 Reading and Research. *1-3 credit(s).*

An independent study course, under public health faculty guidance, to pursue reading and research in an area of specific student interest.

Medical Doctor/Clinical and Translational Science Program

Doctor of Medicine/Master of Science Dual Degree

Program Description

This program is operated by the Clinical and Translational Science Institute (CTSI) of Southeast Wisconsin. The mission of the CTSI is to develop an integrated, shared home for clinical and translational research and to establish a borderless, collaborative, and investigator/ community/patient- friendly, research environment. The CTS MD/MS dual degree program fits with the CTSI's strategic goals of providing quality education and training to cultivate the next generation of clinical and translational researchers.

The MD/MS in Clinical and Translational Science Program is designed for students who wish to pursue a medical career with a research focus. During the first two years of the dual degree program, students complete the basic science coursework for the MD degree. In addition, dual degree students take some coursework to meet the requirements for the MS degree. MS degree coursework emphasizes clinical study design, biostatistics, and research methods, and provides students with an opportunity to conduct a mentored research project. Some coursework meets the requirements for both degrees. Students engage in their research projects during the summer between the first and second years of study and subsequent research electives during the third and fourth years of medical school.

Upon entering the dual degree program, students have a designated faculty advisor who will provide guidance in the program and assist them in identifying an area of research that is of interest to them. During the first year of the program, students will have the opportunity to explore a wide range of research options and to identify a research mentor with whom they will work.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

To enroll in the MD/MS program, applicants must first be admitted to the Doctor of Medicine program.

Fields of Study

MS degree coursework emphasizes clinical study design, biostatistics, and research methods, and provides students with an opportunity to conduct a mentored research project.

Credits Required to Graduate

36 credits

Program Credit Requirements

The MD/MS in Clinical and Translational Science consists of 36 credit hours. 27 credits are from required courses, 9 credits are from thesis hours. The program is designed to be completed in four (4) academic years.

Required Courses

10226 Regulatory Issues in Human Subject Research Protections. *3 credits.*

There is no question that the fruits of research have fueled medical progress. Yet, the history of research involving human subjects is not unblemished. Federal regulations, based on ethical principles set forth in the Belmont Report, now govern much of the research undertaken in the United States. In this course, we will explore the history and substance of research regulations in the United States, the application of the regulations to specific research issues, and situations where the regulations do not provide clear guidance.

20101 Introduction to Clinical and Translational Science. *3 credits.*

The goal of this course is to help students understand the foundations of translational science, develop an understanding of the benefits and difficulties associated with translational research, and to understand and evaluate the role of interdisciplinary and team science in translational research. Coursework will include weekly reading of peer-reviewed manuscripts, assignments, and a final project. Weekly classes will include discussion of reading and assignments are designed to allow practice of critically reading and planning translational science projects. The course will meet once per week for a total of 18 weeks.

20120 Introduction to Health Disparities Research. *3 credits.*

The course is an introduction to health disparities. By the end of the course, the student will be able to understand the relationship between inequities in social determinants of health and health outcomes in various populations. Coursework will include weekly readings from one textbook on multicultural medicine and health disparities as well as peer-reviewed articles to demonstrate the concepts in real-world experiences. Weekly classes will include discussion of readings. Course projects will be assigned and are designed to allow practice of critically reading and appraising the literature related to applied health disparities research and also to understand the theoretical bases for health equity research. The course will meet once per week for a total of 18 weeks. Students must choose between this course or Introduction to Health Economics.

20160 Foundations in Health Services Research. *3 credits.*

The course will provide the student with a broad understanding of health services research design and methodology, as well as provide the student with the opportunity to engage in a mentored, individualized, in-depth study experience. By the end of the course the student will be able to understand key theories that serve as the foundation of health services research and understand the process of developing a research idea and translating it into an R-series level NIH proposal. Coursework will include weekly reading of peer-reviewed manuscripts, one introductory textbook on health services research, and one introductory textbook on designing clinical research. Weekly classes will include discussion of reading and assignments are designed to allow practice of critically reading and planning health services research projects.

20201 Introduction to Epidemiology. *3 credits.*

This course is designed to provide epidemiology research methodologies to clinical practical applications. Topics include diagnostic testing, meta-analysis, qualitative research, data collection and survey design. Students will learn to apply research methodologies to large data sets or populations, while understanding the reliability, and validity of their methods.

20220 Clinical Statistics I. *3 credits.*

This is an introductory course in evidence discovery that demonstrates the concepts and application of statistical techniques/tools, given the role of statistics as an information science. The course is intended to inform and provide quantitative skills for graduate students interested in undertaking research in clinical medicine, epidemiology, public health, translational and biomedical sciences. This course emphasizes the basic dogma of statistics namely the central tendency theorem as well as sampling as the core of statistics. With the characterization of statistics as descriptive and inferential, the descriptive arm of statistics is stressed in this course namely summary statistics. Basic probability concepts are covered to stress the importance of sampling prior to reliable inference from the sample data. Sample estimation of the population and the precision (confidence interval) are described as well as the hypothesis testing notion in inferential statistics. The parametric and non-parametric methods are introduced with the intent to describe the methods as applicable to continuous (ratio, interval, cardinal) and discrete (categorical binary, dichotomous) data.

20260 Introduction to Dissemination and Implementation Science. *3 credits.*

The course is an introduction to dissemination and implementation and science research methods both theoretical and applied. By the end of the course the student will be able to understand the science of dissemination and implementation and applied methods for dissemination and implementation. Coursework will include weekly reading of peer-reviewed manuscripts and one introductory textbook on dissemination and implementation science. Weekly classes will include discussion of reading and course projects are designed to allow practice of critically reading and planning implementation research.

20262 Introduction to Health Economics. *3 credits.*

The course is an introduction to health economics both theoretical and applied. By the end of the course the student will be able to understand the basics of health economics including the principles and research methodology used to apply economic concepts to the health field. Coursework will include weekly reading of peer reviewed manuscripts and one introductory textbook on health care economics.

Weekly classes will include discussion of reading and course projects are designed to allow practice of critically reading and conducting health economic research.

Students must choose between this course and Introduction to Health Disparities.

20290 Research Elective. *3 credits.*

Students will select a mentor of their choice and will develop a novel research study using either their mentor's data or publicly available data to answer their question. Mentors will be expected to guide students and to serve as a content expert to effectively provide feedback and ensure adequate scientific rigor is achieved for their projects. Course deliverables by the last day of this course are comprised of a two-page literature review, a one-page abstract of their research project progress thus far, along with a scientific poster as it currently stands. Both the abstract and poster will also be submitted at the medical school SAMS poster day during the Fall term. Students will meet with their research mentor on a predetermined regular basis over the course of 9 weeks during the summer.

20299 Master's Thesis. *3 credits.*

A total of 6 master's thesis credits is required for program completion. All students will complete a master's thesis describing a translational or clinical research project in which he or she participated in both the design and execution. The Committee will be comprised of a thesis mentor and two additional faculty members (one of whom is a biostatistician). The Committee will approve the project in advance, will provide guidance and supervision of the project, and will critique and, if appropriate, approve the thesis.

20302 Research Seminar. *3 credits,*

The goal of this course is to provide Master's students protected time to develop their thesis questions and to provide students with an opportunity to receive feedback on their thesis project at regular intervals in a structured format. By the end of the course students will be able to develop a research question, conduct a comprehensive literature review, select appropriate methods to answer the research question, and present their findings in written and oral formats. This course will also teach students how to provide constructive criticism and to effectively evaluate the work of their peers. Coursework will include developing a systematic review, providing constructive critiques of the work of other students in the seminar, developing a PowerPoint presentation, and developing a scientific poster presentation. All MS students will be required to take the course. First year Master's students will develop their research question, complete a thorough literature review of the topic of interest in the form of a systematic review, and begin to identify methods that will be used to answer their research question. While second year students will conduct the necessary steps to answer their research question, write their results and conclusions, and prepare an oral presentation of their thesis work to be presented before their colleagues at the end of the semester and during MCW student research day. All students will be expected to provide feedback to their classmates and will receive feedback from their peers and the course director. Each class period four students will present some aspect of their project and will receive feedback from peers and the course director.

Required Courses as Needed

20002 Master's Thesis Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

Medical Physiology, Master of Medical Physiology

Program Description

The Master's Program in Medical Physiology at MCW is a one-year program designed for a college graduate looking to strengthen their academic credentials in preparation for applying to U.S. medical schools. Our program is closely integrated with the first-year medical student curriculum at MCW, providing you with a comparable experience encountered as a medical student, including examinations. Our program also offers an MCAT course in collaboration with Wisconsin Lutheran College. We maintain a small cohort size to ensure each student receives the personalized academic advising and career development they need to succeed. Graduates of this program will have a solid foundation for medical school, graduate school, and jobs in academia, industry, or government positions, as supported by our strong placement data.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

This program recommends applicants submit MCAT scores with their applications. MCAT scores are preferred, but other health professional school test scores (e.g., GRE, DAT, or PA-CAT) can be

used if MCAT scores are not available.

Credits Required to Graduate

32 credits

Required Courses

MMPY 41100 Foundations of Medicine. *6 credits.*

The goal of the Foundations of Medicine Block is to establish a strong, broad foundation of basic scientific knowledge to prepare Phase 1 learners for future systems-based units. This block integrates concepts of biochemistry, cell biology, genetics, physiology, anatomy, microbiology, pharmacology, and biostatistics to form a wide base of knowledge related to cell and tissue biology, organ systems, patients and communities, which are applied to solve clinical problems in the context of patient-based scenarios. Learning experiences are reinforced with small group discussions, interpretation of molecular diagnostic tests, and laboratory activities.

MMPY 41110 Hematology/Immunology. *5 credits.*

The Hematology/Immunology block is designed to teach medical students the biochemical, genetic, and physiological etiology of hematological and immunological pathologies and physiological responses to infection. This course will be anchored in hematopoiesis and concern the biology of hematopoietic stem cell progeny. This will include the physiology and pathophysiology of red blood cells, white blood cells and platelets, and related pathologies including: immune system disorders, autoimmunity, leukemia and lymphoma, and clotting disorders. This course will be divided into three sections: (i) immunology, (ii) leukemia and lymphoma, and (iii) hematology. Basic science content will be provided in parallel to small group case-based learning sessions and histopathology laboratories, which will be designed to emphasize and expand upon the pathophysiology.

MMPY 41120 Musculoskeletal/Skin. *4 credits.*

MSS will introduce students to the foundational science of muscle, bone and skin anatomy through didactics which will include online pre-work, in class lectures, case-based discussion and lab sessions. Integrated case studies will examine the development, structure and function of skin, skeletal muscle, cartilage, ligament and bone anatomy through examination of pathology, radiology, immunology, cell biology, pharmacology, anatomy, physiology, and developmental biology. Additionally, students will learn about neoplasms, injuries, infections, and degenerative disorders commonly seen for each system. At the conclusion of the unit, students will recognize common skin and musculoskeletal disease states and communicate effectively using accepted anatomical terminology. This course involves pre-work in the form of webcasts, narrated PowerPoints, reading assignments and quizzes via Brightspace. Following weekly case discussions, there will be a summative session to ensure students understand the main takeaways from the discussion. Additional opportunities to reinforce major concepts may be available through online quizzes and post-work assignments.

MMPY 41130 Gastroenterology and Nutrition. *5 credits.*

The Gastrointestinal and Nutrition block is a four-week course that describes and defines the normal structural components of the digestive system and reviews the physiologic processes of the cells and tissues of those organs. That foundational knowledge of gastrointestinal system functions will be expanded upon to describe the genetic, nutritional, and immunological mechanisms that underlie human gastrointestinal diseases. This course integrates foundational cell and molecular biology, immunology, pharmacology, pathology, anatomy, and physiology concepts to provide learners with an understanding of gastrointestinal system tissue functions. Knowledge of these concepts will also aid learners in recognizing and identifying the presentation and abnormal physiology of gastrointestinal components during various disease states. Learning activities in the gastrointestinal unit include synchronous and asynchronous didactic sessions, gross anatomy, histology, and pathology laboratory sessions, and small group case-based discussions focused on various gastrointestinal pathologies and disease states.

MMPY 41200 Graduate Human Anatomy. *4 credits.*

The Graduate Human Anatomy course teaches students the structural aspects of the human body and their clinical correlates. Students explore the macroscopic anatomy and three-dimensional relationships of organs, organ-systems, regions of the body, cross-sections, and spaces. Learning experiences are reinforced with cadaveric dissection and a variety of clinical imaging techniques, including plain films (X-rays), CT and MRI scans. Aside from medical knowledge, the course nurtures teamwork, interpersonal and communication skills, and professionalism. The course continues the anatomy component of the Phase 1 MCWfusion curriculum, specifically the Cardiovascular, Respiratory, Renal, and Endocrine/Reproductive Blocks. The course comprises webcast lectures and body donor dissections and is graded on letter scale.

MMPY 41280 Career Development Training. *2 credits.*

The goal of the MMP Career Development Training course is to increase your skills and readiness for medical school and graduate school applications. To achieve this goal, you will be working with your peers, current medical and graduate students, and diverse range of faculty to write an application cycle calendar, personal statement, and CV/resume, and to execute individual and group mock interviews. Importantly, this course has been designed specifically for MMP students, and does not overlap with other graduate or medical school courses at MCW. Ultimately, MMP Career Development Training will provide timely and important preparation for applying to medical or graduate school, and for your continuing education and careers in science and medicine.

PHYS 08208 Current Topics in Physiology. *2 credits.*

The course is designed to give enrolled students a window into current advances and techniques in modern physiological research. Students will be required to attend and be graded upon attendance at weekly lectures/seminars sponsored by the Dept. of Physiology, evaluations of each presentation, and attendance and participation in the series of faculty discussion sessions (4 or more per semester) with the course director or other physiology faculty members.

PHYS 08275 Special Problems in Physiology. *1 credit.*

Readings and/or research under direction of a faculty member in a specialized field of physiology. Under specific circumstances, may be substituted for formal courses.

BIOE 10222 Ethics and Integrity in Science Course. *1 credit.*

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered during the spring and summer terms only.

INBS 16265 Organ Systems Physiology. *2 credits*.

Introduction to Organ Systems Physiology is a first-year elective course that focuses on the classic topics in physiology – the science of regulation and control systems – including the Physiology of Cells, Muscle, Cardiovascular, Pulmonary, Renal, GI, Endocrine, and Reproduction. It will also introduce the students to animal models in physiological research appropriate for the topic at hand.

PHYS 08295 Reading and Research. *1-9 credits (elective)*.

The course of study for Reading and Research is designed by each student with his/her advisor to focus on readings in literature in the student's field, to build bibliographic resources for the dissertation, and to conduct supervised, independent research.

INBS 16271 Fundamentals in Neuroscience. *3.5 credits (elective)*.

Fundamentals of Neuroscience follows a multidisciplinary approach to current knowledge about the structural and functional properties of the nervous system. The mechanisms of the nervous system are described at the molecular, cellular, systems and complex brain function levels. The course includes in-class lectures, seminars from prominent scientists (video archives), and written assignments. The purpose of this course is to introduce 1st year graduate students to the structure and function of the human nervous system.

INBS 16278 Functional Genomics. *3 credits (elective)*.

This course will use a variety of didactic lecture, paper discussions, and hands on bioinformatics learning to provide students with fundamentals in genomics, transcriptomics, proteomics, genetic manipulation, epigenetics, protein modeling and molecular simulation. Theory, practical applications, and analysis methods will be taught.

Microbiology & Immunology, Doctor of Philosophy

Program Description

The Graduate Program in Microbiology & Immunology (M&I) seeks to teach and train the next generation of research scientists in the molecular and cellular biology of bacterial pathogens, virus/host interactions, the innate and adaptive immune responses, animal and cellular model systems of infection and immunity, the microbiome, and the molecular mechanisms of gene expression, signal transduction, cell proliferation and cancer biology. It is the goal of the faculty and students to utilize classic and cutting-edge methodologies and technologies to conduct interdisciplinary research that will solve problems that are of significant biomedical importance.

Through participation in a variety of departmental activities, M&I graduate students receive a broad education and training base that encompasses various aspects of biomedical science including those centered in the fields of bacteriology, immunology, virology, molecular biology, microbe-host interactions, genetics/gene expression and cancer biology. Our students develop essential technical skills and/or capabilities that allow them to conduct independent research, and effectively communicate scientific accomplishments in both written and oral forms. In general, M&I faculty seek to promote accomplishment of these objectives by providing a stimulating work and learning environment in which scientific curiosity is encouraged, scientific questions of significance are investigated, rigorous experimental approaches to problems are designed and executed, data is critically interpreted, and sound and cogent concepts are developed. The M&I Graduate Program assesses accomplishment of these objectives through several mechanisms including didactic course requirements, required annual research in progress (RIP) scientific presentations, semi-annual meetings with dissertation committee members coupled with submission of mentor summary statements, and dissertation-specific qualifying and defense examinations. The ultimate goal of the M&I Graduate Program is to produce well-rounded scientists that possess the necessary maturity, experience, and knowledge base to become independent leaders in the biomedical sciences within academia, industry, government, or other health-related career venues. These goals are consistent with the mission of the MCW Graduate School and of the Medical College of Wisconsin as a whole.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Students enter the graduate program in the Department of Microbiology and Immunology through the [Interdisciplinary Program in Biomedical Sciences \(IDP\)](#), [the Neuroscience Doctoral Program \(NDP\)](#), [the Medical Scientist Training Program \(MSTP\)](#), or by direct entry into the department. Students who choose a mentor in the Department of Microbiology and Immunology will enter the department upon satisfactory completion of a written and/or oral qualifying examination.

Fields of Study

The following areas of research in the Department of Microbiology and Immunology offer excellent opportunities for graduate dissertation projects:

Molecular Biology of Bacterial Pathogenesis

- Characterization of the molecular properties of bacterial exotoxins, with the goals of defining their mode of action and how toxins modify host cell physiology
- Identification of host and bacterial proteins involved in attachment of *Borrelia burgdorferi* and *Leptospira interrogans* to human cells, and the consequences of these interactions for the host

- Investigation of the secretion and function of bacterial virulence factors encoded by *Pseudomonas aeruginosa* and other opportunistic infections
- Studies of the pathogenesis of *Mycobacterium tuberculosis*, with particular emphasis on defining the genetic determinants required for establishment, maintenance, and reactivation from latent infection
- Investigation of genetic, biochemical, and signaling pathways required for antimicrobial resistance and gut colonization by enterococci
- Studies of the phasevarion regulatory system in the pathogenesis of *Haemophilus influenzae*, *Moraxella catharrhalis*, *Helicobacter pylori* and *Neisseria* species

The Microbiome

- Role of xenobiotics in disrupting gut microbiota and consequences on metabolism
 - Importance of bacteriophage in regulating composition of gut microbiota
 - Role of xenobiotics in disrupting the gut microbiota/metabolism, two-component signaling, and predatory-prey interactions
 - Role of the mosquito microbiome in shaping immune responses to malaria
- Infection

Molecular Genetics of Human Viruses

- Investigation of the molecular mechanisms employed by human herpesviruses to escape detection by the immune system
- Characterization of interactions between cancer-associated gamma herpesviruses and host systems that either promote or restrict lytic and chronic gamma herpesvirus infection, with a particular interest in lipid metabolism
- Investigation of proteins involved in establishing a permissive environment for herpesvirus replication using mass spectrometry

Cellular and Molecular Analysis of the Immune Response

- Autoimmunity. Investigation into roles of T cells and B cells and mechanisms of central and peripheral tolerance in autoimmune disorders including type 1 diabetes, multiple sclerosis, arthritis, and colitis
- Oncology. Investigation of tumor microenvironment and immune response against solid and liquid tumors; mechanistic studies of immunity, anti-tumor evasion and tolerance in anti-tumor response
- Cellular therapy. Allogeneic hematopoietic cell transplantation (Allo-HCT), studies of allogeneic T- and B-cell mediated graft-versus-host (GVH) and graft-versus leukemia/lymphoma (GVL) responses. Adoptive T-cell Therapy (ACT) including chimeric antigen receptor (CAR) T-cell therapy. Investigations of T-cell activation, differentiation, persistence, and migration immunotherapy against cancer
- Inflammation. Basic mechanisms of immune regulation and inflammation; structure function studies of adhesion molecules and integrins; immunobiology investigations of chemokines and cytokines and their receptors

- Host Defense. Studies of MHC, antigen presentation, innate and adaptive immune responses to bacterial and viral infections, autoimmune diseases, and cancer
- Immune Metabolism and Molecular Immunology. Seahorse energy metabolism, metabolomic, proteomic, single cell sequencing, and ATAC sequencing analyses of immune system in health and disease

Molecular Mechanisms of Gene Expression

- Studies of the mechanisms and consequences of signal transduction: endothelin-mediated signaling through small GTPases, cyclooxygenase-2, and the prevention of apoptosis.
- Study of two-component signal transduction networks in bacteria
- Studies of mosquito non-coding genetic variation in transcriptional enhancers and differential malaria susceptibility

Credits Required to Graduate

60 credits minimum

Program Credit Requirements

Students entering from the IDP and NDP, or who are direct admits into the department, are required to take 9 credits of advance coursework as a minimum. MSTP students are required to take 6 credits of advanced coursework at a minimum. All students must also complete 16242 Techniques in Molecular and Cellular Biology, and 25300 Seminar for 2 semesters (1 semester if the student receives an "A" or "A-"). Furthermore, students entering from the IDP or NDP need to complete 16270 Integrated Microbiology and Immunology, 16292 Writing a Scientific Paper, and 16293 Writing an Individual Fellowship which are all from the IDP. Students entering from the MSTP must also take 16217 Foundations in Biomedical Sciences III from the IDP.

Required Courses

10222 Ethics and Integrity in Science. *1 credit.*

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered during the spring and summer terms only.

10444 Research Ethics Discussion Series. *1 credit.*

Prerequisite: 10222 Ethics and Integrity in Science.

The course is directed by members of the Bioethics Faculty and provides facilitated discussions of a series of topics in research ethics. Discussions are led by members of the Basic Science faculty and are focused on ethical issues that commonly come up in biomedical research. The course is meant to not only reinforce the basic ethics taught in the online course Ethics and Integrity in Science, which is a prerequisite, but also to explore the gray areas of the individual topics. The intent is to offer students illustrative examples of ethical issues that might arise in their careers, to emphasize the ethical principles that apply in such situations, and to provide practical guidance on how these types of situations should be correctly handled. This course is offered as a discussion series. Students are expected to attend and participate in the discussion. Bioethics 10444 is offered during the spring terms only.

16217 Foundations in Biomedical Sciences III. *3 credits.*

Module III builds on the cell biology fundamentals introduced in the latter part of Modules I and II. This course starts with three lectures on cell signaling and a discussion of a primary research article on the topic. This forms the basis of Exam 1. The second part focuses on proteins specialized for ion flux and transport. Themes are exemplified by case studies on several diseases that affect either epithelial transport or excitable cells. Exam 2 captures this material. The third and last part of the course focuses on DNA homeostasis, genetic principals, the basis of stem cells and cancer. Exam 3 closes out the Fall semester.

16242 Techniques in Molecular and Cellular Biology. *2 credits.*

The primary objective for this course is to provide information and conceptual knowledge of a number of the most common techniques required for biomedical research. The information presented in this course should facilitate comprehension of the scientific literature and introduce procedures that students will commonly use in their research projects. The lecture materials will present the theory behind each technique, the practical limitations of each technique and the questions that each technique addresses. Additional lectures will assist the student in use bioinformatics and biostatistics methods and in preparing results for publication.

The course emphasizes the following core competencies: biomedical knowledge of a variety of commonly used research techniques, research skills through understanding published literature and experimental design, critical and creative thinking through the ability to judge information in the literature related to the techniques covered, interpersonal and communication skills through class participation and discussion and written exams, professionalism by interacting respectfully with others in the class, arriving to class on time and being prepared to participate, and lifelong learning by developing new learning and independent thinking skills.

16270 Integrated Microbiology and Immunology. *3 credits.*

The purpose of this course is to introduce basic and integrated concepts in immunology and cellular microbiology through lectures, readings from texts and current journals. The course is geared toward first year students matriculating into the Microbiology and Immunology (MI) Graduate Program as well as any student interested in contemporary concepts of cellular microbiology, immunology, and host pathogen interactions. The course has been designed to integrate fundamental concepts in immunology and microbiology with the goal of students being able to understand and critically evaluate the complex nature of host-pathogen interactions and immune dysfunction regardless of their specific research focus. Students learn fundamental concepts in immunology and gain an appreciation of the basic properties of bacteria and virus structure, replication, and pathogenesis. In the final block of the course, students integrate their knowledge of pathogens and the immune system. Required for IDP and NDP students.

16292 Writing a Scientific Paper. *1 credit.*

This course will present a step-by-step approach to putting together a scientific paper. Students will be divided into groups of 3, and these groups will stay together for the duration of the course. Each group will be given an identical set of data with which to compose a manuscript. Each week, a different aspect of paper writing will be discussed, and students will be given a take home assignment to write that particular component of the paper within the small groups. In the final week of the class, the finished papers will be peer reviewed by 2 other groups and a member of the faculty. The course will be graded on attendance, successful and timely completion of the assignments and evaluation of the final manuscript.

16293 Writing an Individual Fellowship. *2 credits.*

Prerequisite: 16292 Writing a Scientific Paper

This course provides a systematic approach towards writing a F31-like individual research fellowship. Topics include the organization of the NIH, how the NIH invites investigators to submit applications to support their doctoral studies, how PhD trainees and their mentors respond to these invitations, and how the NIH reviews a fellowship application. A weekly didactic session will be presented to the entire group of students who will have weekly individual writing assignments to complete and will have a weekly small group session to share their progress towards the completion of their writing assignments. Each student will identify a mentor-approved research topic that will be developed into a fellowship proposal, emphasizing the writing of a Summary, Specific Aims Page, and Research Plan as outlined in PA-19-195 and SF-424(F).

25295 Reading and Research. *1-9 credit(s).*

The course of study for Reading and Research is designed by each student with his/her advisor to focus on readings in literature in the student's field, to build bibliographic resources for the dissertation, and to conduct supervised, independent research.

25300 Seminar. *1 credit.*

In this course, students are trained to organize and present a scientific seminar. Students identify an area of interest and select one to several reports from the literature on which to base the seminar. Students are instructed how to develop an effective introduction, how to progress through the description of scientific questions, the presentation of data figures and conclusions, and how to logically tie the data and conclusions together into a coherent and compelling story. Students are required to meet periodically with the course directors prior to their seminar to decide on the seminar topic, to discuss PowerPoint slides, and to conduct practice seminars. Students must also meet with course directors following the seminar to discuss audience comments and recommendations for improvement. Students in the Department of Microbiology and Molecular Genetics (MMG) are required to enroll and complete the seminar course twice as part of their departmental core curriculum.

25399 Doctoral Dissertation. *9 credits.*

This course is required for the completion of the PhD degree. The PhD candidate must submit a dissertation based on original research of a high scholarly standard that makes a significant contribution to knowledge in their chosen field.

Required Courses as Needed

25002 Master's Thesis Continuation. *0 credits.*

Prerequisite: 25299 Master's Thesis

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

25003 Doctoral Dissertation Continuation. *0 credits.*

Prerequisite: 25399 Doctoral Dissertation

This is a form of registration available to students who have completed all of the required coursework, including dissertation credits but have not yet completed the writing of the Dissertation. Continuation status is limited to three consecutive terms following the completion of Dissertation credits.

25299 Master's Thesis. *6-9 credits.*

Students in the Ph.D. degree program who cannot or elect not to complete that program may be allowed to transfer to the Master's program. This transfer must be approved by the student's advisor, the Program Director, the Chair, and the Graduate School. To transfer to the Master's Program, the student must be in good academic standing according to regulations established by the Graduate School.

Elective Courses

25210 Principles of Laboratory Animal Science. *1 credit.*

A one-credit hour course surveying the issues fundamental to the successful use and care of animals in biomedical research. Students will gain knowledge of an array of core topics in laboratory animal science, including: understanding and navigating ethical and regulatory frameworks in which animal research occurs; basic biology and care of common laboratory species; managing rodent breeding colonies; contemporary issues in laboratory rodent genetics; important sources of nonexperimental variables in animals research, including nutrition, microbial status, and pain; strategies for minimizing pain and distress in animal subjects; and basic techniques in laboratory rodent handling and restraint.

25230 Current Topics in Microbiology and Immunology. *2 credits.*

This advanced course consists of introductory lectures on a selected topic followed by in-depth discussions of original research articles on topics such as bacterial invasion, virulence factors, immune evasion, virus-host interactions, T-cell functions, and viral regulatory proteins.

25234 Cellular and Molecular Immunology. *3 credits*

This course is an introduction to the experimental basis of immunology through readings from texts and current immunological journals. Topics covered include the cellular basis of the immune response, antigens, antibodies, and molecular basis for generation of immunologic diversity, regulation of the immune response, innate and adaptive immunity and diseases of the immune system.

25251 Advanced Molecular Genetics. *3 credits.*

Specific topics in molecular genetics are explored through a combination of lectures and sessions in which research papers are presented and critically evaluated. Emphasis is placed on developing the ability to critically read and evaluate experimental results from original research papers. Specific topics for this course, which vary from one year to the next, include: cancer genetics, gene therapy, meiotic recombination, and DNA repair.

25259 Mucosal Immunity. *1 credit.*

Prerequisites: 16270 Integrated Microbiology and Immunology.

This focused immunology course on the mucosal immune system introduces students to advanced concepts and biomedical research relevant to human health and disease at the mucosal surface.

25260 Mucosal Pathogenesis. *1 credit.*

Prerequisites: 16270 Integrated Microbiology and Immunology.

Mucosal Pathogenesis is an upper-level, one-credit hour Microbiology course that focuses on the interactions of microbial pathogens with cells of the mucosal epithelium. Students gain a detailed and comprehensive understanding of specific infectious microbial pathogens, and the mechanisms utilized by the microorganisms to associate, invade, and/or cause disease at the mucosal surface. Microorganisms to be discussed include those that target the respiratory tract, the gastrointestinal tract, and the genital/urinary tract.

25261 Bacterial Toxin-Mucosal Cell Interactions. *1 credit.*

Prerequisites: 16270 Integrated Microbiology and Immunology.

Bacterial Toxin-Mucosal Cell Interactions is a one-credit hour upper-level Microbiology course that addresses the interactions between bacterial toxins and mucosal cells. The goal of this course is to provide students an appreciation of how bacterial toxins that target mucosal cells function as virulence factors and are utilized as vaccines and for clinical therapies. The course format includes formal lectures and paper discussions.

25262 Tumor Immunology. *1 credit.*

Prerequisites: 16270 Integrated Microbiology and Immunology.

Tumor Immunology is an upper-level, 1-credit hour Microbiology/immunology course that will focus on the interactions of tumor cells with various components of the immune system. These interactions are complex, and immune-based strategies for treating cancer have had limited success in the clinic. This course will examine the following: (a) how the immune recognizes tumor cells as foreign, (b) immune strategies for targeting cancer, (c) barriers to achieving effective tumor immunity, (d) monitoring the immune response to cancer, and (e) use of animal models to study the interactions between tumor cells and the immune system.

The goals of the course will be to gain an in-depth understanding of the complex interactions between tumor cells and the immune system, and to learn how animal models can be used to better understand these interactions. While the course will be heavily weighted towards the discussion of important papers in the field of Tumor Immunology, it will also involve didactic lectures. Students will be evaluated through attendance and participation (30% of final grade) and a final exam (70% of final grade). The course will meet twice a week for a total of 6 weeks.

25263 Signaling in the Immune System. *1 credit.*

Prerequisites: 16270 Integrated Microbiology and Immunology.

Signaling in the Immune System is an upper-level, 1-credit hour Microbiology course that focuses on how cell signaling processes shape and determine the activity of the immune system. Topics to be discussed include how cell signaling modulates cell development, antigen recognition, cell activation and migration. The course will consist of formal lectures by instructor and group discussions from scientific papers. Students will be evaluated by a single closed-book exam (60% of final grade). The final 40% of the student's grade is determined by attendance and active participation in group discussions.

25264 Advanced Immunology. *1 credit.*

Prerequisites: 16270 Integrated Microbiology and Immunology.

Immunology is currently enjoying a golden age, and breakthroughs in immunology research have transformed our understanding of many areas of biomedical science. This rapidly evolving landscape is also giving rise to novel immune-based therapeutic approaches to prevent and cure many diseases such as autoimmunity, cancer, and infectious diseases. This is an advanced course to explore the experimental basis of immunology through lectures, readings from texts, and current immunological journals. Topics covered include the cellular basis of the immune response, antigens, antibodies, and molecular basis for generation of immunologic diversity, regulation of the immune response, innate and adaptive immunity, and diseases of the immune system. The objective for this course is to provide a comprehensive understanding of the experimental basis of the fundamental principles of immunology. This course is designed for second year graduate students and is intended to enhance the interpretation of experimental data and experimental design in the field of immunology. Emphasis will be placed on current knowledge of the immune system and how to read and critically analyze the primary literature. Topics to be discussed include Innate Immunity and Antigen Recognition, Immune Signaling and Development, Immune Responses and Diseases of the Immune System.

25265 Immunological Tolerance. *1 credit.*

Prerequisites: 16270 Integrated Microbiology and Immunology.

Immunological Tolerance is an upper-level 1 credit hour Microbiology & Molecular Genetics course that focuses on the multiple mechanisms responsible for maintaining self-tolerance. Failure of self-tolerance results in autoimmune diseases that can affect every organ system of the human body. Conversely, the induction of self-tolerance may also be exploited for therapeutic purposes. In this mini course, we will consider the general features and mechanisms of self-tolerance in T cells and B cells. These mechanisms include (1) anergy, (2) deletion by apoptosis, and (3) suppression by regulatory T cells. In addition, this course will consider select models of autoimmunity that have proven to be effective tools in our effort to understand tolerance as a complex biological process. In addition to formal lectures by the instructors, the course will feature group discussions of seminal papers that have shaped current thinking in the field. Students will be evaluated by their participation during group discussion and by a single take-home final examination. Each component will contribute equally to the final grade. The course will meet twice weekly for 6 weeks.

25266 Clinical Immunology. *1 credit.*

Prerequisites: 16270 Integrated Microbiology and Immunology.

Clinical Immunology is an upper-level, one-credit hour Microbiology course that will provide advanced information and conceptual knowledge regarding the human immune system in health and disease. Specific topics will include primary and secondary immunodeficiencies, autoimmune diseases (systemic autoimmune diseases and autoimmune diseases of the skin and gastrointestinal tract), atopic diseases, HLA and bone marrow transplantation. The course will comprise a combination of formal lectures by instructors, and group discussions of scientific papers from the recent literature.

25267 Bacterial Diversity and the Microbiome.

25269 Advanced Bacterial Physiology. *1 credit.*

Prerequisites: 16270 Integrated Microbiology and Immunology.

Advanced Bacterial Physiology is a 1 credit hour Microbiology course that focuses on fundamental and diverse aspects of bacterial physiology. Students will gain an understanding of the mechanism's bacteria use to execute, coordinate and control basic cellular processes such as macromolecular synthesis, nutrient utilization and metabolism, signal transduction, and stress responses. The course focuses on critical evaluation and discussion of papers from the primary literature. These discussions will be augmented by short didactic presentations of background material by the course director to place the paper's topic and findings in context.

25271 Membranes and Organelles. *1 credit.*

Prerequisites: 16216 Foundations in Biomedical Sciences II.

Membranes and Organelles is an upper-level, one-credit hour Cell Biology course that focuses on the topics of membrane protein trafficking and membrane biogenesis. Students will gain a detailed understanding of organelles and membrane protein trafficking and degradation, membrane vesicle fusion, secretion, and membrane biogenesis. The course will consist in part of readings of seminal papers describing the genetic screens for sec and vps mutants, as well as the Rothman in vitro vesicle fusion experiments. These experiments provide the first description of the proteins we know today to be involved in membrane protein fusion, secretion, and trafficking. After gaining grounding in the design and outcome of these historic screens, the class will focus on what is known today about the initial proteins identified in the original ground-breaking screens. The newer areas of membrane biology will follow similar format, examining the discovery of paradigm, and delving into what is known today. Students will be evaluated by participation in paper discussion (40%) and an in-class paper presentation (60%).

25280 Classical Papers in Microbiology and Immunology. *1 credit.*

Classical Papers in Microbiology and Immunology (M&I) is a course suitable for all students in the Microbiology and Immunology graduate program. Through this course, instructors and students will review, discuss, and critique notable papers from the last century that have made seminal contributions to the fields of molecular biology, bacteriology, virology, immunology, biochemistry, and/or genetics. The impact of these contributions in the present day will also be discussed. In addition to instructor identified papers, students will also choose and formally present a recent paper for discussion that they feel has made a substantive contribution to the biomedical sciences. Papers to be discussed are expected to vary between semesters depending on topic of discussion and instructor(s) facilitating the discussion. Ultimately, this course is expected to provide students with an expanded knowledge base of seminal papers in the broad fields of microbiology and immunology.

25289 Career Internships in the Biomedical Sciences. *0 credits.*

Career Internships in the Biomedical Sciences is a 0-credit training course that will provide students in the Graduate Program in Microbiology and Immunology with an opportunity to complete a semester-long internship in a biomedical science career outside the postdoc-faculty pathway. Currently, this new course is being developed with three internship modules (Teaching, Clinical Microbiology, and Research Core Management); however, it is expected that new internship opportunities will be developed in the future to address additional student interests. Each internship has been developed such that students will gain direct hands-on experience in the career opportunity. Each internship also includes extensive opportunity for one-on-one mentoring with individuals experienced in that career pathway (i.e., site directors, course directors, research core managers, etc.). As part of each internship, students are required to complete a “scholarly activity” that will employ the use of information and/or techniques that have been acquired during the training period. Finally, site directors and/or other participants active in the student’s training during the internship will complete evaluations providing the student with feedback regarding their performance during the internship.

25298 Immunology Journal Club. *1 credit.*

The purpose of this course is to learn, evaluate and present cutting edge immunological research topics from leading journals to gain knowledge of new immunological findings and to stay current with emerging technologies. Students will attend and present in a weekly independently organized immunology journal club. During the semester, students will be required to attend the journal club and write a short paragraph after each presentation regarding what they learned. This should include: The knowledge gap being addressed, the hypothesis being tested, strengths and weaknesses of the study and resulting conclusions. If a journal club is not scheduled for a particular week, the students will be required to attend an independently organized immunology work-in-progress series. For the students’ presentations, students will select a research paper of immunological focus from a list of preapproved journals. While the student can choose any topic of interest, the selection will require approval from the course director. The presentation will consist of a PowerPoint style presentation including the following information: Why the student selected the article, the knowledge gap being addressed, background information supporting the hypothesis, the hypothesis being tested, discussion of the approaches and experimental data, strengths and weaknesses of the study and conclusions including potential future directions. Ultimately, this course is expected to provide students with an expanded knowledge base of current topics in the broad field of immunology.

Neuroscience, Doctor of Philosophy

Program Description

Neuroscience is a dynamic, rapidly growing field devoted to study of the central and peripheral nervous systems in health and disease. During the past three decades, a group of eminent scientists with research interests in many areas of neuroscience has been assembled in the basic science and clinical departments of the Medical College of Wisconsin. These individuals, who have an impressive record of pre- and post-doctoral training, research, and extramural funding in the neurosciences, form the core faculty for this training program. The research areas of the neuroscience faculty include functional imaging, electrophysiological, biochemical, cellular, and molecular approaches to questions of fundamental and clinical importance.

The Neuroscience Doctoral Program (NDP) is committed to providing a specialized education in neuroscience ranging across molecular and cellular mechanisms, systems neuroscience, and brain imaging. This education is designed to serve the students well as they move on to pursue specialized research projects. During the first year, students take a core curriculum designed to provide a foundation in neuroscience as well as biochemistry, cell biology, genetics, molecular biology, physiology, signaling, laboratory techniques, and biostatistics. Students also take 4-6 credits of elective courses and a summer course on general writing to help with the qualifying exam and professional development.

Students will also explore their individual research interests through 3-4 laboratory rotations that emphasize experimental design and integration into a research team. Students are encouraged to take advantage of the diversity of neuroscience research opportunities in the participating departments. Once a student selects a dissertation advisor at the end of their first year, they will become affiliated with one of the following graduate programs: Biochemistry; Biophysics; Cell and Developmental Biology; Physiology; Microbiology and Immunology; or Pharmacology and Toxicology. In addition, students may also pursue a clinical focus if admitted into the Basic and Translational Science Program. Additional information about individual departmental programs is given elsewhere in this publication.

During the second year of their studies, students will take a course in writing an NIH style fellowship and prepare and defend a proposal based on their own research that will provide them with valuable experience in mastering a scientific problem, formulating a suitable hypothesis, and drafting a feasible and productive experimental scheme with which to test it. The qualifying exam for NDP students will be administered by the graduate program that their thesis laboratory is affiliated with (e.g., Biochemistry; Biophysics; Cell and Developmental Biology; Physiology; Microbiology and Immunology; or Pharmacology and Toxicology).

Successful completion of this qualifying exam is a major step towards being admitted to candidacy for a PhD degree in the thesis department. During their second semester and in subsequent years, students are also expected to successfully complete a number of advanced courses selected with the guidance of their dissertation mentor, dissertation committee, and the Graduate Program Director of their affiliated department. Upper-level students will focus on the development of their research skills, performance of their doctoral research, and completion of their dissertation. Once affiliated with a particular laboratory and department, students can expect attentive personal mentoring by their dissertation advisor. Throughout their graduate careers, students in the Interdisciplinary Program continue to meet as a group to share ideas, insights, and research accomplishments with each other and with the faculty. This program prepares students for advanced study in one of the following PhD degree-granting programs: [Biochemistry](#); [Biophysics](#); [Cell and Developmental Biology](#); [Microbiology and Immunology](#); [Physiology](#); and [Pharmacology and Toxicology](#).

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Successful applicants will show undergraduate achievement in science and mathematics courses and have prior research experience.

Fields of Study

Faculty participating in the Neuroscience Doctoral Program have diverse research interests such as:

- Neurodegeneration and Neurotrauma

Neurodegenerative diseases including ALS, Parkinson's disease, Alzheimer's disease, and Spinal Cord Injury are studied using stem cells, animal models, and human tissues.

- Neuroimaging, Tissue to Brain

State of the art brain imaging and biomedical engineering technologies are used to study language, vision, hearing, motor control, learning and memory, and brain associated cancers.

- Cellular and Synaptic Communication

Neuronal communication and receptor-ligand binding at the cellular and structural levels are studied using cutting edge genetic, electrophysiological, and computational tools to dissect mechanisms of development, signaling, and disease associated with vision, learning and memory, and addiction.

- Function of Neural Systems in Normal and Disease states

Sleep disruption, breathing, chronic stress, reward and drug abuse systems, hearing, touch and temperature sensation and chronic pain are studied using diverse model systems and approaches.

Required Courses

INBS 16211 Introduction to Biomedical Research. *1 credit*.

This course reflects student's participation in laboratory research rotations and their attendance at seminars and/or journal clubs.

INBS 16215 Foundations in Biomedical Sciences I. *3 credits.*

This is a didactic based course that will provide the background for understanding the biochemical basis of life. Students will learn about thermodynamic principles that drive biochemical and enzymatic reactions, protein structure and protein dynamics and the thermodynamic principles that define these structures and their interactions with other biomolecules, the principles that define their functional activities and then an application of this knowledge to an understanding of metabolic pathways. Students will also learn how foundational biochemical principles apply to certain physiological settings in health and disease and how pharmacological intervention can modulate physiological responses. The format of the course involves lectures and review sessions which are designed to promote class discussion of the relevant material.

INBS 16216 Foundations in Biomedical Sciences II. *3 credits.*

An interdisciplinary course that provides students with a foundation in the areas of gene expression, and basic and contemporary issues in cell biology. The material is primarily presented in lecture format, but a significant number of paper discussion sessions are also included.

INBS 16217 Foundations in Biomedical Sciences III. *3 credits.*

Module III builds on the cell biology fundamentals introduced in the latter part of Modules I and II. This course starts with three lectures on cell signaling and a discussion of a primary research article on the topic. This forms the basis of Exam 1. The second part focuses on proteins specialized for ion flux and transport. Themes are exemplified by case studies on several diseases that affect either epithelial transport or excitable cells. Exam 2 captures this material. The third and last part of the course focuses on DNA homeostasis, genetic principals, the basis of stem cells and cancer. Exam 3 closes out the Fall semester.

INBS 16218 Foundations in Biomedical Science IV. *3 credits.*

This course is designed to give students fundamental introductory concepts impacting the fields of Microbiology and Immunology, Neurobiology and Pharmacology in three modules. Topics were selected and the three modules integrated based on the essential concept that human biological responses and development are shaped by chemical cues. The impact on human biology from contact or colonization with microorganisms and the innate and adaptive immune responses to contact are discussed in the first module. Module 2 focuses on the physiological aspects of how signals are perceived and interpreted by the human nervous system. Module 3 communicates fundamental aspects of pharmacology, emphasizing the molecular and cellular levels of signaling and signal transduction. Each session was designed to incorporate current analytical methods, computational and statistical aspects of data analysis and clinical or practical impacts on human health and disease.

INBS 16242 Techniques in Molecular Cell Biology. *2 credits.*

The primary objective for this course is to provide information and conceptual knowledge of a number of the most common techniques required for biomedical research. The information presented in this course should facilitate comprehension of the scientific literature and introduce procedures that students will commonly use in their research projects. The lecture materials will present the theory behind each technique, the practical limitations of each technique and the questions that each technique addresses. Additional lectures will assist the student in use bioinformatics and biostatistics methods and in preparing results for publication. The course emphasizes the following core competencies: biomedical knowledge of a variety of commonly used research techniques, research skills through understanding published literature and experimental design, critical and creative thinking through the ability to judge information in the literature related to the techniques covered, interpersonal and communication skills through class participation and discussion and written exams, professionalism by interacting respectfully with others in the class, arriving to class on time and being prepared to participate, and lifelong learning by developing new learning and independent thinking skills.

INBS 16245 Statistics for Basic Sciences. *1 credit.*

This course is designed to provide graduate students working in the research laboratory or studying the experimental sciences with fundamental knowledge in biostatistics. It will focus on descriptive statistics, elements of probability theory, estimation, tests of hypotheses, methods of categorical data tabulation and analysis. After completion of the course, students should be able to develop an appropriate study plan to explore a biomedical research question and execute simple statistical analysis of the data collected in the study. Emphasis will be placed on understanding concepts as well as learning to apply the covered statistical techniques. Students will also learn how to read, interpret, and critically evaluate statistical concepts in the literature.

INBS 16271 Fundamentals of Neuroscience. *3.5 credits.*

Fundamentals of Neuroscience follows a multidisciplinary approach to current knowledge about the structural and functional properties of the nervous system. The mechanisms of the nervous system are described at the molecular, cellular, systems and complex brain function levels. The course includes in-class lectures, seminars from prominent scientists (video archives), and written assignments. The purpose of this course is to introduce 1st year graduate students to the structure and function of the human nervous system.

INBS 16272 Graduate Neuroanatomy. *0.5 credits.*

Graduate Neuroanatomy is a lab-based course intended to accompany MCW course Fundamentals of Neuroscience. The purpose of this course is to introduce 1st year PhD students to the anatomy of the human nervous system.

INBS 16290 Professional Development I. *1 credit.*

Emphasis in this course will be placed on oral and written communication, critical literature review, and responsible conduct in research. Students will learn good practices for peer review and perform interactive exercises to review each other's work.

INBS 16291 Professional Development II. *1 credit.*

Professional Development follows a multidisciplinary approach to promote individual career development in the biomedical sciences. The course includes lectures, discussion, sessions, seminars, and hands-on activities. Topics of particular emphasis are oral and written communication and rigor and ethics in scientific research.

INBS 16292 Writing a Scientific Paper. *1 credit.*

This course will present a step-by-step approach to putting together a scientific paper. Students will be divided into groups of 3, and these groups will stay together for the duration of the course. Each group will be given an identical set of data with which to compose a manuscript. Each week, a different aspect of paper writing will be discussed, and students will be given a take home assignment to write that particular component of the paper within the small groups. In the final week of the class, the finished papers will be peer reviewed by 2 other groups and a member of the faculty. The course will be graded on attendance, successful and timely completion of the assignments and evaluation of the final manuscript.

INBS 16293 Writing an Individual Fellowship. *2 credits.*

Prerequisite: 16292 Writing a Scientific Paper

This course provides a systematic approach towards writing a F31-like individual research fellowship. Topics include the organization of the NIH, how the NIH invites investigators to submit applications to support their doctoral studies, how PhD trainees and their mentors respond to these invitations, and how the NIH reviews a fellowship application. A weekly didactic session will be presented to the entire group of students who will have weekly individual writing assignments to complete and will have a weekly small group session to share their progress towards the completion of their writing assignments. Each student will identify a mentor-approved research topic that will be developed into a fellowship proposal, emphasizing the writing of a Summary, Specific Aims Page, and Research Plan as outlined in PA-19-195 and SF-424(F).

NSCI 12298 Journal Club. *1 credit.*

Weekly readings will be selected from contemporary and historical literature in neuroscience. Informal discussions will include participation from students and faculty.

Elective Courses

NSCI 12221 Advanced Systems Neuroscience. *3 credits.*

Prerequisite: 16271 Fundamentals of Neuroscience or consent of the course director.

Readings and discussion in cellular, molecular, and developmental neurobiology. Among the topics covered in this course are ion channels and the ionic basis of potentials; mechanisms of synaptic transmission; neurotransmitter receptors and their receptors; sensory signal transduction and neural development.

NSCI 12237 Cellular and Molecular Neurobiology. *3 credits.*

Prerequisite: 16271 Fundamentals of Neuroscience or consent of the course director.

Readings and discussion in cellular, molecular, and developmental neurobiology. Among the topics covered in this course are ion channels and the ionic basis of potentials; mechanisms of synaptic transmission; neurotransmitter receptors and their receptors; sensory signal transduction and neural development.

INBS 16277 Cognitive Neuroscience. *1 credit.*

Cognitive neuroscience examines human brain information processing at the level of large-scale neurobiological systems. Some examples include information processing that underlies learning and retrieving concepts, comprehending, and producing language, directing, and maintaining attention, and recognizing sensory objects. Each session in this course will begin with a 1-hour contextual lecture, followed by review and discussion of two relevant landmark papers, sometimes with opposing views. Emphasis will be placed on understanding the processing models central to each domain, the extent to which these models are supported by empirical evidence from neuroimaging, and the relevance of the field to a variety of human brain disorders. There are a number of courses offered by other departments at the Medical College of Wisconsin that can be taken by students in the Neuroscience Doctoral Program depending upon their research interests. The goal is to provide each student with the basics of modern neuroscience and then allow them to customize a program of course work that best meets their needs.

Neuroethics, Certificate

Program Description

The Certificate in Neuroethics program training valuable to both clinicians and researchers; as the ever-advancing fields of neuroscience and neurotechnology posit new challenges, there is an increased demand for thoughtful consideration by individuals with a strong foundation in brain science as well as an expertise in ethical analysis and policy development. The Certificate in Neuroethics program is offered in an accessible online format available to individuals from across the nation.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Criteria for admission includes academic training and professional experience in a relevant area; commitment to the field of neuroethics; and promise in the program's academic areas.

Credits Required to Graduate 12 credits

Program Credit Requirements

Students in the Certificate program are required to complete a total of four three-credit online courses. All four of the courses are required.

These required courses provide students with the necessary legal, philosophical, and clinical perspectives necessary and valuable to researchers and clinicians interested in neuroethics. Two of the courses will be offered in the fall semester, and the other two will be offered in the spring semester. Enrolled students have the choice to take one class per semester and finish the certificate in four semesters or take two classes per semester and finish in two semesters. The technical requirements are minimal, i.e., ability to use a Web-browser and email. Class discussions and additional work are conducted primarily in non-real time, so students can participate at their convenience during each week. The pedagogical capabilities of the online environment enhance the class discussions and allow for individualized instructor

Required Courses

10210 Philosophical Bioethics. *3 credits.*

In this course, students will explore the foundations of philosophical ethics in the West, and how early themes shape current work in philosophical bioethics. To this end, students will read works by Aristotle, Kant, and Mill, focusing on their theoretical approaches to ethics. Detailed discussion will focus on the ethics theories known as virtue theory, casuistry, deontology, utilitarianism, communitarianism, and principlism, considering both their historical origins and modern interpretations. Students will apply these theories to topical themes of moral development, abortion, assisted death and others, noting their strengths and weaknesses.

10223 Law and Bioethics. *3 credits.*

This course provides an introduction to legal principles and legal precedent relevant to issues in bioethics, aimed at providing the foundation for understanding relevant law concerning these issues.

10245 Philosophical Neuroethics. *3 credits.*

Neuroscience and neurotechnologies are generating knowledge about the nature of consciousness, moral emotions, free will, and concepts of mind and self. While some of these latter concepts are philosophical in nature, they have nonetheless practical, ethical, and sociopolitical significance that demands critical evaluation. New findings in neuroscience are increasingly applied in clinical, legal, and social contexts: 1) neurostimulation technologies provide alternative treatments for debilitating neurological disorders (e.g., Parkinsonism, Treatment-Resistant Depression), 2) neuroimaging technologies are used increasingly for forensic purposes (e.g., lie detection), and 3) neurodevices are developed to enhance cognitive performance (e.g., military applications) or control/alter behavior (moral bioenhancement). Emerging neurotechnologies are likely to impact nearly every aspect of human existence and society at large. This course focuses on the historical, philosophical, ethical issues arising from advances in neuroscience/ neurotechnologies in the broader social milieu.

10248 Clinical Neuroethics. *3 credits.*

Neuroscience and neurotechnologies are generating knowledge about the nature of consciousness, moral emotions, free will, and concepts of mind and self. While some of these latter concepts are philosophical in nature, they have nonetheless practical, ethical and socio-political significance that demands critical evaluation. New findings in neuroscience are increasingly applied in clinical, legal and social contexts: 1) neurostimulation technologies provide alternative treatments for debilitating neurological disorders, 2) neuroimaging technologies are used increasingly for forensic purposes, and 3) neurodevices are developed to enhance cognitive performance or control/alter behavior. Emerging neurotechnologies are likely to impact nearly every aspect of human existence and society at large. This course focuses on the ethical, social and practical issues arising from advances in neuroscience/neurotechnologies in the clinical context.

Pharmacology & Toxicology, Doctor of Philosophy

Program Description

The Pharmacology & Toxicology Doctoral program provides diverse research opportunities in the areas of cardiovascular, cancer, and neurosciences. An emphasis is placed on cellular and molecular pharmacology/toxicology and signal transduction. The primary objective of our program is to provide students with an academic background, professional skills, and expertise in state-of-the-art scientific approaches needed to investigate and solve the important biological problems that will be the focus of research in the decades to come. Our graduate degree program is multidisciplinary in nature and has strong associations with researchers in other basic science and clinical departments.

There are three major components to the program: graduate level coursework, successful completion of a combined written and oral qualifying exam, and the completion of a novel, publishable research project.

The coursework requirements of the doctoral program are flexible and tailored to the needs of individual students as much as possible. However, emphasis is placed on instruction in the areas of basic pharmacological principles, mechanism of drug action, signal transduction, and pharmacological techniques.

After completion of the initial coursework, students take a qualifying examination. The qualifying examination is designed to ensure a solid biomedical knowledge base has been established and consists of writing and defending a research proposal. The exam typically takes place in the second year of the doctoral program.

After a student has successfully passed his or her qualifying examination and completed the basic coursework, his or her time is spent engaged in a cutting-edge research project in the laboratory of a member of the department's graduate faculty. The final requirement of the program is for the student to write and defend a dissertation describing their research project.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program requires students to have a specific interest in pharmacology. This interest should be described in the personal statement section of the application.

Entry to the Pharmacology & Toxicology Graduate Program is through Direct Admission, [Interdisciplinary Program in Biomedical Sciences](#) (IDP), [the Neuroscience Doctoral Program](#) (NDP), or the [Medical Scientist Training Program](#) (MSTP). The student is admitted after completion of the first-year curriculum or through the Medical Scientist Training Program following the second year of Medical School. The student elects to complete their dissertation work with faculty of the Pharmacology & Toxicology Graduate Program. The student will then have the opportunity to continue graduate studies by selecting among a wide range of courses offered from the Graduate School as well as other programs affiliated with the Medical College. Courses to be taken are based on the student's interests and consultation with the student's advisor.

Fields of Study

Research opportunities in the department are available in four general areas:

Biochemical and Molecular Pharmacology

- Fundamentals of molecular biology and biochemistry are applied to mechanisms of drug action
- Ongoing projects include studies of the effects of drugs on signal transduction processes, including receptors and intracellular signaling molecules

Cardiovascular Pharmacology

- Cellular pharmacology of vascular smooth muscle and endothelium
- Molecular biology of cell adhesion molecules and other inflammatory mediators
- Mechanisms of action of anti-hypertensive and anti-ischemic drugs Cancer Biology
- Study of cellular signaling pathways that promote malignancy and metastasis
- Identification of genes and genetic mutations that increase susceptibility to cancer
- Discovery of agents that prevent the development of cancer

Neuropharmacology

- Biochemical and molecular mechanisms of action of centrally acting neurotransmitters and drugs
- Signal transduction mechanisms involving receptors, ion channels and protein trafficking
- Biochemical mechanisms of drug abuse

Credits Required to Graduate 60 credits minimum

Program Credit Requirements

All students who enter the program must take 10222 Ethics and Integrity in Science, 10444 Research Ethics Discussion series, the 07301 Seminar course offered by the Pharmacology & Toxicology Doctoral program, and 07100 Foundations in Pharmacology. In addition, nine additional credits of advanced elective coursework are required; 6 of these credits must be from elective courses offered from the Pharmacology & Toxicology Doctoral program listed below (up to 3 credits can be of graduate level courses offered from any program at MCW). All students entering directly into the Pharmacology & Toxicology program are required to complete the IDP curriculum during their 1st year. Alternatively, the program director may waive these requirements.

Required Courses

10222 Ethics and Integrity in Science Course. *1 credit.*

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered during the spring and summer terms only.

10444 Research Ethics Discussion Series. *1 credit.*

Prerequisite: 10222 Ethics and Integrity in Science.

The course is directed by members of the Bioethics Faculty and provides facilitated discussions of a series of topics in research ethics. Discussions are led by members of the Basic Science faculty and are focused on ethical issues that commonly come up in biomedical research. The course is meant to not only reinforce the basic ethics taught in the online course Ethics and Integrity in Science (Bioethics 10222B), which is a prerequisite, but also to explore the gray areas of the individual topics. The intent is to offer students illustrative examples of ethical issues that might arise in their careers, to emphasize the ethical principles that apply in such situations, and to provide practical guidance on how these types of situations should be correctly handled. This course is offered as a discussion series. Students are expected to attend and participate in the discussion. Bioethics 10444 is offered during the spring terms only.

07100 Foundation in Pharmacology. *2 credits.*

This course is divided into three modules. The first module provides a brief introduction into fundamental concepts of pharmacology, methods to study actions of drugs, and nontraditional therapeutic approaches, including gene targeting and biologics. The second and third modules are primers on pharmacological therapies in cancer, cardiovascular disease, and neuropsychiatric disease. The course includes in-class lectures, three written exams, and an oral presentation by each student. Offered during the spring terms only.

07301 Seminar. *1 credit.*

Weekly invited seminar speakers present their research on selected topics. This is a required course for all Pharmacology & Toxicology students except those taking dissertation.

07399 Doctoral Dissertation. 6-9 credits.

This course is required for the completion of the PhD degree. The PhD candidate must submit a dissertation based on original research of a high scholarly standard that makes a significant contribution to knowledge in their chosen field.

16211,16212, 16213, 16214 Introduction to Biomedical Research I-IV. *1 credit each.*

This course reflects student's participation in laboratory research rotations and their attendance at seminars and/or journal clubs.

16215 Foundations in Biomedical Sciences I. *3 credits.*

This course is a didactic based course that will provide the background for understanding the biochemical basis of life. Students will learn about thermodynamic principles that drive biochemical and enzymatic reactions, protein structure and protein dynamics and the thermodynamic principles that define these structures and their interactions with other biomolecules, the principles that define their functional activities and then an application of this knowledge to an understanding of metabolic pathways. Students will also learn how foundational biochemical principles apply to certain physiological settings in health and disease and how pharmacological intervention can modulate physiological responses. The format of the course involves lectures and review sessions which are designed to promote class discussion of the relevant material.

16216 Foundations in Biomedical Sciences II. *3 credits.*

This is an interdisciplinary course that provides students with a foundation in the areas of gene expression, and basic and contemporary cell biology. The material is primarily presented in lecture format, but significant number of discussion sections and data interpretation discussions are also included. Students are expected to gain fundamental knowledge in the areas of gene regulation, translational and posttranslational control and cellular architecture.

16217 Foundations in Biomedical Sciences III. *3 credits.*

Module III builds on the cell biology fundamentals introduced in the latter part of Modules I and II. This course starts with three lectures on cell signaling and a discussion of a primary research article on the topic. This forms the basis of Exam 1. The second part focuses on proteins specialized for ion flux and transport. Themes are exemplified by case studies on several diseases that affect either epithelial transport or excitable cells. Exam 2 captures this material. The third and last part of the course focuses on DNA homeostasis, genetic principals, the basis of stem cells and cancer. Exam 3 closes out the Fall semester.

16218 Foundations in Biomedical Science IV. *3 credits.*

This course is designed to give students fundamental introductory concepts impacting the fields of Microbiology and Immunology, Neurobiology and Pharmacology in three modules. Topics were selected and the three modules integrated based on the essential concept that human biological responses and development are shaped by chemical cues. The impact on human biology from contact or colonization with microorganisms and the innate and adaptive immune responses to contact are discussed in the first module. Module 2 focuses on the physiological aspects of how signals are perceived and interpreted by the human nervous system. Module 3 communicates fundamental aspects of pharmacology, emphasizing the molecular and cellular levels of signaling and signal transduction. Each session was designed to incorporate current analytical methods, computational and statistical aspects of data analysis and clinical or practical impacts on human health and disease.

16242 Techniques in Molecular and Cellular Biology. *2 credits.*

The primary objective for this course is to provide information and conceptual knowledge of a number of the most common techniques required for biomedical research. The information presented in this course should facilitate comprehension of the scientific literature and introduce procedures that students will commonly use in their research projects. The lecture materials will present the theory behind each technique, the practical limitations of each technique and the questions that each technique addresses. Additional lectures will assist the student in use bioinformatics and biostatistics methods and in preparing results for publication. The course emphasizes the following core competencies: biomedical knowledge of a variety of commonly used research techniques, research skills through understanding published literature and experimental design, critical and creative thinking through the ability to judge information in the literature related to the techniques covered, interpersonal and communication skills through class participation and discussion and written exams, professionalism by interacting respectfully with others in the class, arriving to class on time and being prepared to participate, and lifelong learning by developing new learning and independent thinking skills.

16245 Statistics for Basic Sciences. *1 credit.*

This course is designed to provide graduate students working in the research laboratory or studying the experimental sciences with fundamental knowledge in biostatistics. It focuses on descriptive statistics, elements of probability theory, estimation, tests of hypotheses, methods of categorical data tabulation and analysis. After completion of the course, students should be able to develop an appropriate study plan to explore a biomedical research question and execute simple statistical analysis of the data collected in the study. Emphasis is placed on understanding concepts as well as learning to apply the covered statistical techniques. Students also learn how to read, interpret, and critically evaluate statistical concepts in the literature.

16290 Professional Development I. *1 credit.*

Emphasis in this course will be placed on oral and written communication, critical literature review, and responsible conduct in research. Students will learn good practices for peer review and perform interactive exercises to review each other's work.

16291 Professional Development II. *1 credit.*

Professional Development follows a multidisciplinary approach to promote individual career development in the biomedical sciences. The course includes lectures, discussion, sessions, seminars, and hands-on activities. Topics of particular emphasis are oral and written communication and rigor and ethics in scientific research.

16292 Writing a Scientific Paper. *1 credit.*

This course will present a step-by-step approach to putting together a scientific paper. Students will be divided into groups of 3, and these groups will stay together for the duration of the course. Each group will be given an identical set of data with which to compose a manuscript. Each week, a different aspect of paper writing will be discussed, and students will be given a take home assignment to write that particular component of the paper within the small groups. In the final week of the class, the finished papers will be peer reviewed by 2 other groups and a member of the faculty. The course will be graded on attendance, successful and timely completion of the assignments and evaluation of the final manuscript.

16293 Writing an Individual Fellowship. *2 credits.*

This course provides a systematic approach towards writing a F31-like individual research fellowship. Topics include the organization of the NIH, how the NIH invites investigators to submit applications to support their doctoral studies, how PhD trainees and their mentors respond to these invitations, and how the NIH reviews a fellowship application. A weekly didactic session will be presented to the entire group of students who will have weekly individual writing assignments to complete and will have a weekly small group session to share their progress towards the completion of their writing assignments. Each student will identify a mentor-approved research topic that will be developed into a fellowship proposal, emphasizing the writing of a Summary, Specific Aims Page, and Research Plan as outlined in PA-19-195 and SF-424(F).

Required Courses as Needed

07002 Master's Thesis Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

07003 Doctoral Dissertation Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including dissertation credits but have not yet completed the writing of the Dissertation. Continuation status is limited to three consecutive terms following the completion of Dissertation credits.

07299 Master's Thesis. *1-6 credits.*

Students in the Ph.D. degree program who cannot or elect not to complete that program may be allowed to transfer to the Master's program. This transfer must be approved by the student's advisor, the Program Director, the Chair, and the Graduate School. To transfer to the Master's Program, the student must be in good academic standing according to regulations established by the Graduate School.

Elective Courses

07225 Ion Channels and Signal Transduction. *3 credits.*

This course provides discussion of the function of ion channels in mammalian cells. This course provides an in-depth presentation of mechanisms of drug action at a level designed for doctoral students in the Biomedical Sciences. The emphasis is on ion channel structure, function, and regulation as well as the action of drugs and toxins that interact with ion channels.

07226 Current Concepts of Cancer Biology. *3 credits.*

This course provides students with basic knowledge of cancer biology. Topics include signaling pathways that promote malignancy and metastasis, cancer susceptibility genes, and chemoprevention.

07295 Reading and Research. *1-9 credits.*

The course of study for Reading and Research is designed by each student with his/her advisor to focus on readings in literature in the student's field, to build bibliographic resources for the dissertation, and to conduct supervised, independent research.

16275 Understanding Cell Signaling Through Therapeutic Drugs. *2 credits.*

This course will present advanced concepts in cellular signaling by analyzing the signaling mechanisms responsible for the therapeutic benefit, unanticipated toxicity, and limited effectiveness of particularly well-known drugs that target specific signal transduction pathways. The topics are designed to promote an enhanced understanding of the complexities of multiple signaling pathways, and a sophisticated appreciation of how these pathways are integrated to produce cellular responses. The course has a translational emphasis by focusing on the multiple molecular actions of current FDA-approved drugs, as well as discontinued drugs that were removed from the market due to unanticipated toxicity or limited effectiveness. Lectures presented by the instructors will provide an in depth overview of different signaling pathways, and manuscript discussions will promote additional advanced analysis that will creatively engage the students.

Physiology, Doctor of Philosophy

Program Description

cardiovascular, renal, and respiratory physiology, and utilizing genetically manipulated model systems, functional genomics, proteomics, bioinformatics, and computational biology. Didactic coursework covers a broad interdisciplinary foundation complemented with several integrative systems physiology courses. Trainees develop critical thinking skills and other professional skills through performance of cutting-edge research to prepare the next

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

Students with a major in the Biological or Physical Sciences who have demonstrated above average scholastic ability are eligible to apply. Preferred undergraduate course work should include Biology (8 credits), General Chemistry (8 credits), Organic chemistry (8 credits), Physics (8 credits), Algebra (3-4 credits), and Calculus (3-4 credits).

Fields of Study

There are six general areas of Physiology in which students may conduct research. Both human and animal models are studied.

Circulatory

- Overall control of the cardiovascular system with emphasis on the neurohumoral control of arterial pressure and the interactions of the renal body fluid volume system.
- Regulation of cardiac output and local regulation of blood flow in the microcirculation.
- Ongoing projects relate to the role of circulatory smooth muscle in hypertension. Cardiac hypertrophy.

Endocrinology

- Renin-angiotensin-aldosterone system, vasopressin, and prostaglandin with emphasis on the role of these systems on the control of body fluids, electrolytes, arterial pressure regulation and basal metabolic rate determination in the context of obesity.

Genetics

- Identification and characterization of gene(s) involved in the development of complex disorders in humans and rat models.
- QTL mapping, linkage and association analysis, haplotype and linkage disequilibrium analysis of single nucleotide polymorphisms, correlation of genetic polymorphisms to gene and protein expression, and development of transgenic animal models.
- Projects currently study genetic risk factors for cardiovascular and renal disease, obesity, diabetes, and brain disorders.

Molecular and Cell Biology

- Cell membrane channels and their modulation by neurotransmitters, humoral agents, local factors, and drugs.
- Cell signaling in renal, respiratory, and cardiovascular diseases
- DNA binding proteins and their role in health and models of disease

Renal

- The importance of autocrine, paracrine, and hormonal factors in the regulation of renal tubular and vascular function.
- Elucidation of the factors important in the development of renal failure and hypertensive disease.
- Renal ion channels in the control of blood pressure and kidney diseases.

Respiratory

- The role of the carotid chemoreceptors and medullary, pontine, and cerebellar nuclei in the control of breathing.
- Specific emphasis is on respiratory rhythm and pattern generation and chemosensitivity.
- Studies are targeted to gain insight into Sleep Disordered Breathing, the Sudden Unexpected Death in Epilepsy, and Central Congenital Hypoventilation Syndrome.

Credits Required to Graduate 60 credits minimum

Program Credit Requirements

The emphasis of our PhD program is to provide training in whole-animal integrative Physiology complemented by training in cellular and molecular Physiology. To achieve this objective, all PhD students are required to complete a sequence of required courses in addition to elective courses.

For a complete listing of all courses and their timing of enrollment throughout the Physiology PhD program, see the Physiology Student and Faculty Handbook (requests sent to Matt Hodges, PhD (mhodges@mcw.edu)).

All students enter through the IDP program and complete the required IDP courses. Additional required courses in the Physiology Program are recommended to be completed in Year 1 include Organ Systems Physiology and Functional Genomics (spring), and Seminar (summer semester).

In the fall of the second year in graduate school, physiology students enroll in all required IDP courses. In addition, they are required to enroll in Advanced Physiology. This 3-credit course provides the foundation for physiological concepts and integrative thinking and covers 4 major physiological systems: 1) endocrinology and reproduction, 2) cardiovascular physiology, 3) respiratory physiology, 4) renal physiology. Material will be covered by completing assigned pre-work (recorded lectures and primary literature) which are complemented by in-person condensed review sessions/lectures and presentation of classical and cutting-edge research publications within each discipline.

Students complete a written and oral Qualifying Examination after completing courses in the Fall of the second year in the program. This examination is administered by the IDP. The written component is a grant-style proposal on a topic chosen by the student, and it usually is derived from didactic course materials, work conducted in laboratory rotations, and/or research that potentially will become part of the student's dissertation. The proposal and performance in the oral component of the Qualifying Exam will be evaluated by the examination committee and if acceptable the student will reach advanced degree status.

In each spring semester following the Qualifying Exam, physiology students enroll in Special Problems in Physiology course which is a journal club discussion of manuscripts. Another requirement of all MCW PhD programs is to fulfill two credits in Bioethics by completing Courses on Ethics and Integrity in Science and Research Ethics Discussion Series which are usually completed in the first two years. Students may choose to enroll in elective courses to complement their academic and research interests. Graduate students in other programs may choose to also enroll in this physiology course. Physiology students can also enroll in courses taught by other basic science departments. The student and their advisor choose elective courses that best meet the students career needs. Course selection can be specific to Physiology (see below) or from other MCW departments or other institutions in Milwaukee.

Required Courses Offered by Physiology

08205 Advanced Physiology. *3 credits.*

Integrative and systems physiology fosters breakthroughs in all areas of life sciences, and a complete understanding of physiology requires an in-depth understanding of normal biological processes to understand how these processes breakdown in cardiovascular, circulatory, respiratory, renal, endocrine and other diseases. In this advanced physiology course, students gain knowledge through mastery of fundamental physiological concepts and principles as a foundation for advanced study at the graduate level and to build a firm foundation for cutting edge research skills in physiology and related disciplines. A major focus of this course is to learn fundamental physiological principles and gain skills in presentation and critical reading/reasoning of primary literature through a combination of self-directed learning (pre-work) and presenting published papers.

08208 Current Topics in Physiology. *2 credits.*

The course is designed to give enrolled students a window into current advances and techniques in modern physiological research. Students will be required to attend and be graded upon attendance at weekly lectures/seminars sponsored by the Dept. of Physiology and their evaluations of each presentation. This course is offered in Fall and Spring semesters. But is only required beginning in the second year of graduate school until the final semester of their thesis work.

08275 Special Problems in Physiology. *1 credit.*

Readings and/or research under direction of a faculty member in a specialized field of physiology. Under specific circumstances, may be substituted for formal courses.

08295 Reading and Research. *1-9 credit(s)*.

The course of study for Reading and Research is designed by each student with his/her advisor to focus on readings in literature in the student's field, to build bibliographic resources for the dissertation, and to conduct supervised, independent research.

08301 Seminar. *1 credit*.

Weekly invited seminar speakers present their research on selected topics.

08399 Doctoral Dissertation. *9 credits*.

This course is required for the completion of the PhD degree. The PhD candidate must submit a dissertation based on original research of a high scholarly standard that makes a significant contribution to knowledge in their chosen field.

Required Courses Offered by IDP and others

10222 Ethics and Integrity in Science. *1 credit*.

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered during the spring and summer terms only.

10444 Research Ethics Discussion Series. *1 credit*.

Prerequisite: 10222 Ethics and Integrity in Science.

The course is directed by members of the Bioethics Faculty and provides facilitated discussions of a series of topics in research ethics. Discussions are led by members of the Basic Science faculty and are focused on ethical issues that commonly come up in biomedical research. The course is meant to not only reinforce the basic ethics taught in the online course Ethics and Integrity in Science, which is a prerequisite, but also to explore the gray areas of the individual topics. The intent is to offer students illustrative examples of ethical issues that might arise in their careers, to emphasize the ethical principles that apply in such situations, and to provide practical guidance on how these types of situations should be correctly handled. This course is offered as a discussion series. Students are expected to attend and participate in the discussion. Bioethics 10444 is offered during the spring terms only.

16215 Foundations in Biomedical Sciences I. *3 credits*.

This new course will be a didactic based course that will provide the background for understanding the biochemical basis of life. Students will learn about thermodynamic principles that drive biochemical and enzymatic reactions, protein structure and protein dynamics and the thermodynamic principles that define these structures and their interactions with other biomolecules, the principles that define their functional activities and then an application of this knowledge to an understanding of metabolic pathways. Students will also learn how foundational biochemical principles apply to certain physiological settings in health and disease and how pharmacological intervention can modulate physiological responses. The format of the course involves lectures and review sessions which are designed to promote class discussion of the relevant material.

16216 Foundations in Biomedical Sciences II. *3 credits.*

An interdisciplinary course that provides students with a foundation in the areas of gene expression, and basic and contemporary issues in cell biology. The material is primarily presented in lecture format, but a significant number of paper discussion sessions are also included.

16217 Foundations in Biomedical Sciences III. *3 credits.*

Module III builds on the cell biology fundamentals introduced in the latter part of Modules I and II. This course starts with three lectures on cell signaling and a discussion of a primary research article on the topic. This forms the basis of Exam 1. The second part focuses on proteins specialized for ion flux and transport. Themes are exemplified by case studies on several diseases that affect either epithelial transport or excitable cells. Exam 2 captures this material. The third and last part of the course focuses on DNA homeostasis, genetic principals, the basis of stem cells and cancer. Exam 3 closes out the Fall semester.

16218 Foundations in Biomedical Science IV. *3 credits.*

This course is designed to give students fundamental introductory concepts impacting the fields of Microbiology and Immunology, Neurobiology and Pharmacology in three modules. Topics were selected and the three modules integrated based on the essential concept that human biological responses and development are shaped by chemical cues. The impact on human biology from contact or colonization with microorganisms and the innate and adaptive immune responses to contact are discussed in the first module. Module 2 focuses on the physiological aspects of how signals are perceived and interpreted by the human nervous system. Module 3 communicates fundamental aspects of pharmacology, emphasizing the molecular and cellular levels of signaling and signal transduction. Each session was designed to incorporate current analytical methods, computational and statistical aspects of data analysis and clinical or practical impacts on human health and disease.

16242 Techniques in Molecular & Cellular Biology. *2 credits.*

The primary objective for this course is to provide information and conceptual knowledge of a number of the most common techniques required for biomedical research. The information presented in this course should facilitate comprehension of the scientific literature and introduce procedures that students will commonly use in their research projects. The lecture materials will present the theory behind each technique, the practical limitations of each technique and the questions that each technique addresses. Additional lectures will assist the student in use bioinformatics and biostatistics methods and in preparing results for publication.

The course emphasizes the following core competencies: biomedical knowledge of a variety of commonly used research techniques, research skills through understanding published literature and experimental design, critical and creative thinking through the ability to judge information in the literature related to the techniques covered, interpersonal and communication skills through class participation and discussion and written exams, professionalism by interacting respectfully with others in the class, arriving to class on time and being prepared to participate, and lifelong learning by developing new learning and independent thinking skills.

16265 Organ Systems Physiology. *2 credits.*

Introduction to Organ Systems Physiology is a first-year elective course that focuses on the classic topics in physiology – the science of regulation and control systems – including the Physiology of Cells, Muscle, Cardiovascular, Pulmonary, Renal, GI, Endocrine, and Reproduction. It will also introduce the students to animal models in physiological research appropriate for the topic at hand. It will follow and build on the first year first semester Graduate School (FBS) course that runs from August-February.

16278 Functional Genomics. *3 credits.*

This course will use a variety of didactic lecture, paper discussions, and hands on bioinformatics learning to provide students with fundamentals in genomics, transcriptomics, proteomics, genetic manipulation, epigenetics, protein modeling and molecular simulation. Theory, practical applications, and analysis methods will be taught.

16278 Functional Genomics. *3 credits.*

This course will use a variety of didactic lecture, paper discussions, and hands on bioinformatics learning to provide students with fundamentals in genomics, transcriptomics, proteomics, genetic manipulation, epigenetics, protein modeling and molecular simulation. Theory, practical applications, and analysis methods will be taught.

16290 Professional Development I. *1 credit.*

Emphasis in this course will be placed on oral and written communication, critical literature review, and responsible conduct in research. Students will learn good practices for peer review and perform interactive exercises to review each other's work.

16291 Professional Development II. *1 credit.*

Emphasis in this course will be placed on oral and written communication, critical literature review, and responsible conduct in research. Students will learn good practices for peer review and perform interactive exercises to review each other's work.

16292 Writing a Scientific Paper. *1 credit.*

This course is offered in the Summer between years 1 and 2. The goal is to enhance specific skill sets related to scientific writing and presentation. The course will focus on the processes important for the preparation of scientific manuscripts and an NIH F-type research proposal. This course will include didactic components, and will require students to work individually, or in small groups. Students will also engage in peer review activities to improve interpersonal, professionalism, and leadership skills.

Required Courses as Needed

08002 Master's Thesis Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

08003 Doctoral Dissertation Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including dissertation credits but have not yet completed the writing of the Dissertation. Continuation status is limited to three consecutive terms following the completion of Dissertation credits.

08299 Master's Thesis. *1-9 credit(s).*

Students in the Ph.D. degree program who cannot or elect not to complete that program may be allowed to transfer to the Master's program. This transfer must be approved by the student's advisor, the Program Director, the Chair, and the Graduate School. To transfer to the Master's Program, the student must be in good academic standing according to regulations established by the Graduate School.

Elective Courses in Physiology

08270 Current Concepts in Cardiovascular Biology. *3 credits.*

This lecture course explores the pathogenic mechanisms that underlie cardiovascular disease the leading cause of death in the United States and other industrialized countries. This course covers foundational principles of cardiovascular physiology and pathophysiology with special emphasis on topics related to the CVCs Signature Programs and Affinity Groups. Unique features of the course include the integration of basic and clinical research intentional pairing of pre-doctoral students with post-doctoral fellows' presentations by students and fellows on selected topics and a section on Current Topics in Cardiovascular Sciences such as racial inequity COVID19 and social determinants of health. In addition to advancing education in cardiovascular biology and pathophysiology major goals are to increase knowledge in translational medicine and enhance peer-to-peer mentoring.

Notes

Summary of explicit expectations and timelines for trainees

Students are expected to: 1) complete four 6-week research rotations, 2) choose a laboratory for their PhD research by March of the first year in graduate school, 3) complete the core didactic IDP and Physiology course curriculum by the end of the second year in graduate school, 4) fulfill the requirements for the PhD Qualifying Examination by the end of the second year in graduate school, 5) form an approved dissertation committee before the start of the Fall semester in Year 2, 6) provide an approved dissertation outline within 6 months after completing the Qualifying Exam, 7) attend and present research at national meetings each year beginning at the end of the second year in graduate school, 8) complete the PhD within 5 years after matriculation, and 9) publish at least 2 peer-reviewed, first-authored manuscripts (adjustable depending on rigor of journal) with at least one accepted at the time of graduation.

Population Health Management, Certificate

Precision Medicine, Certificate

Program Description

The Precision Medicine Education program based in the Medical College of Wisconsin Institute for Health & Equity offers a hybrid of online and in-person coursework toward a 12-credit Graduate Certificate in Precision Medicine (PM). Clinician participants in the program will advance their knowledge, skills, practices, and competencies in PM. Learners may also enroll in courses as non-degree seeking students.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

All applicants will be required to submit their clinical or medical license as part of the application process.

Credits Required to Graduate

12 credits

Required Courses

42100 Introduction to Precision Medicine. *3 credits.*

Introduction to Precision Medicine offers 10 applied learning sessions led by directors of PM Education courses. Students initiate a professional development plan and write and present reports explaining PM concepts, demonstrating research in practice, and judging the validity of PM information.

Elective Courses

Students must pick three of these courses.

42155 Epigenomics for Precision Medicine. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This course is designed to introduce students to Epigenetics and Epigenomics, an important foundation of modern medicine, in particular as an advanced discipline of Precision Medicine. Epigenomics refers to the inheritance of traits independent of the coding capacity of the DNA and is highly influenced by the environment. Fortunately, epigenomic dysregulations that cause diseases are often amenable to therapeutic intervention, thereby auguring the birth of novel therapeutics. Additionally, like genomics, epigenomics is providing promising biomarkers for diagnosis, prognosis, and real-time surveillance of disease progression. In this course, students will discuss molecular mechanisms underlying epigenetic events, the tools for the design and execution of research in this discipline, how to generate and analyze epigenomic data, and the application of Epigenomics to diagnostics, prognostics, and treatments. Entry level visualization of bioinformatics will be covered as it relates to Epigenomics. No prior bioinformatic knowledge is necessary to enroll for course.

42165 Laboratory Genetics and Genomics. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This course discusses the principles of laboratory genetics and genomics and its application in identifying genetic causations for disease.

42170 Medical Genetics, Undiagnosed, and Rare Diseases. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

Medical Genetics, Undiagnosed and Rare Diseases allows students examine the application of genomics to core clinical systems and applying that knowledge to personalized management of patients. Experts in their respective fields will guest lecture in several sessions.

42175 Pharmacogenomics for Precision Medicine. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This elective course is essential and important to Precision Medicine Education of interested enrolled clinician learners. The topic is a session in the Introduction to PM course and harmonizes with the other courses. The topic is also included in a therapeutics chapter in the 8th edition of the classic textbook Thompson & Thompson Genetics in Medicine.

42185 Cancer Precision Medicine. *3 credits. Prerequisite: 42100 Introduction to Precision Medicine*

This course provides an overview of the molecular basis of cancer, the role of germline and somatic alterations in the development/progression of cancer and the various precision assay methodologies utilized in cancer diagnosis, prognostication, and treatment.

Elective offered by the MCW MSGC Program:

GECO 40110 Bioethics in Precision Medicine. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This course will explore the historical, philosophical, rhetorical, and ethical foundations of precision medicine and analyze the bioethical issues raised by this new medical paradigm as they manifest in a variety of clinical, biomedical, and health policy contexts.

Electives offered by the MCW MPH Program:

PUBH 18223 Public Health Policy. *3 credits*

Prerequisite: 42100 Introduction to Precision Medicine

This introductory course will prepare students to know and understand the fundamentals of public health policymaking from the perspective of diverse stakeholders. Throughout the course, students will engage in critical and creative thinking to judge the validity of information and to use defensible and persuasive information to reach new insights in the field of public health policy. Students will be challenged to analyze complex public health policies in areas such as health care reform, health equity, access to care, chronic disease and injury, and global health.

This course will assist students in developing the skills necessary to understand and apply diverse sources of information in policy development and the advocacy to implement public health policy.

PUBH 18232B Introduction to Population Health Management. *3 credits*

Prerequisite: 42100 Introduction to Precision Medicine

This course provides knowledge and builds competencies to improve population health outcomes as well as patient and professional experiences and to reduce per person costs. Themes include population health in the US, the population health ecosystem, and creating cultural change. Competencies include leadership and interprofessional communication, systems thinking, social and behavioral sciences, data management, process and outcome improvement, and policy advocacy.

Electives offered through UW-Milwaukee:

HCA-700 Introduction to Health Care Informatics. *3 credits*

Prerequisite: 42100 Introduction to Precision Medicine

An introduction to the history, theory, applications, and organizational context of health informatics.

[Search Classes \(uwm.edu\)](#)

Precision Medicine, Master of Science

Program Description

The Precision Medicine Education program based in the Medical College of Wisconsin Institute for Health & Equity in partnership with the Mellows Center for Precision Medicine and Genomic Medicine offers online coursework toward a 30- credit Master of Science in Precision Medicine (PM) degree. Clinicians and other participants in the program will advance their knowledge, skills, practices, and competencies in PM. Learners may also enroll in courses as non-degree- seeking students.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

All applicants will be required to submit their clinical or medical license as part of the application process.

Credits Required to Graduate

30 credits

Required Courses

42100 Introduction to Precision Medicine. *3 credits.*

Introduction to Precision Medicine offers 10 applied learning sessions led by directors of PM Education courses. Students initiate a professional development plan and write and present reports explaining PM concepts, demonstrating research in practice, and judging the validity of PM information.

42283 Precision Medicine Research Plan. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This course requires students to develop a PM research question, to perform a literature review and analysis of the topic, and to create a research plan for IRB submission, if needed. The work is guided by a primary mentor and reviewed by two faculty advisors.

42299 Precision Medicine Master's Thesis. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This course requires students to implement a research plan and to write a manuscript discussing the results. The work is guided by a primary mentor and reviewed by two faculty advisors.

Required Courses as Needed

42002 Master's Thesis Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including thesis credits but have not yet completed the writing of the Thesis. Continuation status is limited to three consecutive terms following the completion of Thesis credits.

Elective Courses

Students must pick seven PM elective courses.

42155 Epigenomics for Precision Medicine. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This course is designed to introduce students to Epigenetics and Epigenomics, an important foundation of modern medicine, in particular as an advanced discipline of Precision Medicine. Epigenomics refers to the inheritance of traits independent of the coding capacity of the DNA and is highly influenced by the environment. Fortunately, epigenomic dysregulations that cause diseases are often amenable to therapeutic intervention, thereby auguring the birth of novel therapeutics. Additionally, like genomics, epigenomics is providing promising biomarkers for diagnosis, prognosis, and real-time surveillance of disease progression. In this course, students will discuss molecular mechanisms underlying epigenetic events, the tools for the design and execution of research in this discipline, how to generate and analyze epigenomic data, and the application of Epigenomics to diagnostics, prognostics, and treatments. Entry level visualization of bioinformatics will be covered as it relates to Epigenomics. No prior bioinformatic knowledge is necessary to enroll for course.

42165 Laboratory Genetics and Genomics. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This course discusses the principles of laboratory genetics and genomics and its application in identifying genetic causations for disease.

42170 Medical Genetics, Undiagnosed, and Rare Diseases. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

Medical Genetics, Undiagnosed and Rare Diseases allows students examine the application of genomics to core clinical systems and applying that knowledge to personalized management of patients. Experts in their respective fields will guest lecture in several sessions.

42175 Pharmacogenomics for Precision Medicine. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This elective course is essential and important to Precision Medicine Education of interested enrolled clinician learners. The topic is a session in the Introduction to PM course and harmonizes with the other courses. The topic is also included in a therapeutics chapter in the 8th edition of the classic textbook Thompson & Thompson Genetics in Medicine.

42185 Cancer Precision Medicine. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This course provides an overview of the molecular basis of cancer, the role of germline and somatic alterations in the development/progression of cancer and the various precision assay methodologies utilized in cancer diagnosis, prognostication, and treatment.

Elective offered by the MCW MSGC Program:

GECO 40110 Bioethics in Precision Medicine. *3 credits.*

Prerequisite: 42100 Introduction to Precision Medicine

This course will explore the historical, philosophical, rhetorical, and ethical foundations of precision medicine and analyze the bioethical issues raised by this new medical paradigm as they manifest in a variety of clinical, biomedical, and health policy contexts.

Electives offered by the MCW MPH Program:

PUBH 18223 Public Health Policy. *3 credits*

Prerequisite: 42100 Introduction to Precision Medicine

This introductory course will prepare students to know and understand the fundamentals of public health policymaking from the perspective of diverse stakeholders. Throughout the course, students will engage in critical and creative thinking to judge the validity of information and to use defensible and persuasive information to reach new insights in the field of public health policy. Students will be challenged to analyze complex public health policies in areas such as health care reform, health equity, access to care, chronic disease and injury, and global health. This course will assist students in developing the skills necessary to understand and apply diverse sources of information in policy development and the advocacy to implement public health policy.

PUBH 18232B Introduction to Population Health Management. *3 credits*

Prerequisite: 42100 Introduction to Precision Medicine

This course provides knowledge and builds competencies to improve population health outcomes as well as patient and professional experiences and to reduce per person costs. Themes include population health in the US, the population health ecosystem, and creating cultural change. Competencies include leadership and interprofessional communication, systems thinking, social and behavioral sciences, data management, process and outcome improvement, and policy advocacy.

Electives offered through UW-Milwaukee:

HCA-700 Introduction to Health Care Informatics. *3 credits*

Prerequisite: 42100 Introduction to Precision Medicine

An introduction to the history, theory, applications, and organizational context of health informatics.

[Search Classes \(uwm.edu\)](#)

Public and Community Health, Doctor of Philosophy

Program Description

The purpose of this PhD Program is to transform the research paradigm in public and community health by educating a new generation of innovative researchers who will integrate the rigors of the traditional public health sciences with the essential components of community health improvement through participation and partnership.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has additional specific requirements.

If the undergraduate degree is not in public health, then applicants are required to have six credits of psychology, sociology, or anthropology, three credits of anatomy, physiology, or biology, three credits of statistics and three credits of research methods. Research or professional experience relevant to public and community health is required; graduate degrees (MA, MPH, MS etc.) are not required for admission consideration.

Fields of Study

Students will discover and participate in innovative research conducted by faculty at the Medical College of Wisconsin.

PhD students have the opportunity to learn from these nationally recognized leaders in public and community health utilizing interdisciplinary approaches to complex public health issues.

Credits Required to Graduate 60 credits minimum

Program Credit Requirements

The program is designed for a four-year, full-time commitment. All full-time students in the program are required to be enrolled in a minimum of 9 credits in the fall and spring semesters and 6 credits in the summer. The student is responsible for maintaining full-time enrollment. Full-time students must complete the required coursework and need a minimum of 60 credits to graduate. Students must maintain a full-time credit load each semester to be eligible to receive a stipend.

*The program director may waive program requirements in exceptional circumstances.

Part-Time

It is recommended that all part-time students in the program be enrolled in 1-8 credits in the fall and spring semesters and 1-5 credits in the summer. The student is responsible for maintaining part-time enrollment. Part-time students must complete the required coursework and need a minimum of 60 credits to graduate.

*The program director may waive program requirements in exceptional circumstances.

Required Courses

10222 Ethics and Integrity in Science. *1 credit.*

This course provides the basis for understanding the ethical issues related to basic scientific and medical research, including animal and human subject research, fraud, and misconduct, and governmental, institutional, and researcher responsibilities. Bioethics 10222 is offered during the spring and summer terms only.

10444 Research Ethics Discussion Series. *1 credit.*

Prerequisite: 10222 Ethics and Integrity in Science.

The course is directed by members of the Bioethics Faculty and provides facilitated discussions of a series of topics in research ethics. Discussions are led by members of the Basic Science faculty and are focused on ethical issues that commonly come up in biomedical research. The course is meant to not only reinforce the basic ethics taught in the online course Ethics and Integrity in Science, which is a prerequisite, but also to explore the gray areas of the individual topics. The intent is to offer students illustrative examples of ethical issues that might arise in their careers, to emphasize the ethical principles that apply in such situations, and to provide practical guidance on how these types of situations should be correctly handled. This course is offered as a discussion series. Students are expected to attend and participate in the discussion. Bioethics 10444 is offered during the spring terms only.

19150 Introduction to Epidemiology. *3 credits.*

The course provides: 1) an overview of epidemiologic concepts; 2) an introduction to the approaches and techniques that are used to measure and monitor health status in populations; 3) an introduction to study designs to assess disease prevention and intervention; and 4) an introduction to clinical research study designs that elucidate causative factors for disease.

19201 Community Health Improvement I: Foundations of Public and Community Health. *3 credits.*

Foundations of Public and Community Health: This course is for students entering the PhD Program in Public and Community Health. The overall goal of this course is to provide students with an opportunity to read, critically reflect upon, and actively discuss the course material with classmates and the instructor. Course materials encompass a review of conceptual foundations, theoretical approaches, and critical perspectives on public health policies in the public and community health.

19202 Community Health Improvement II: Health Disparities and Underlying Determinants of Health. *3 credits.*

Prerequisite: 19201 Community Health Improvement I: Foundations of Public and Community Health.

Health Disparities and Underlying Determinants of Health: This course is for students enrolled in the PhD Program in Public and Community Health. This course will provide students with an in-depth introduction to health disparities and social determinants of population health. The course will help clinicians and other public health students and professionals develop and strengthen their knowledge, skills, and ability to critically examine issues of health disparities and to develop a better understanding of some of the underlying social determinants of health disparities, from a multidisciplinary perspective. The ultimate goal of the course is to help students develop the skills needed to apply knowledge and theory of health disparities and determinants of health in designing health services and epidemiological studies and interventions to reduce and ultimately eliminate health disparities.

19203 Community Health Improvement III: Principles and Practices of Community-Academic Partnerships. *3 credits.*

Prerequisite: 19201 Community Health Improvement I: Foundations of Public and Community Health.

Principles and Practices of Community-Academic Partnerships: Community-Based Participatory Research (CBPR) is a collaborative approach to research that combines methods of inquiry with community capacity-building strategies that bridge gaps between evidence-based knowledge and community health practices. Fundamental to creating positive change in a community is to establish processes that foster community engagement. Design and implementation of CBPR should include participation, reflection and empowerment of communities who seek to improve their health or social situations. Students will be exposed to definitions and principles commonly utilized in CBPR. Lectures, readings and discussions will expose students to various models of CBPR that originate from community-academic partnerships to implement research agendas that are dependent upon community participation. Students will identify a health issue of interest and a community organization that is working to address a health-related issue. Students will select a model of community engagement and strategically outline steps to secure community participation.

19204 Community Health Improvement IV: Translating Community Health Improvement into Policy. *3 credits.*

Prerequisite: 19201 Community Health Improvement I: Foundations of Public and Community Health.

Translating Community Health Improvement into Policy: This course is for students in the PhD Program in Public and Community Health. Students will apply their knowledge of community health improvement to their understanding of health policymaking in the US. Students will gain understanding of theoretical foundations of policymaking, the policymaking process, and strategies for translating community health improvement activities into policy. Students will develop a policy and advocacy agenda for a current health policy issue.

19225 Introduction to Statistical Analysis Using Stata. *3 credits.*

This course will provide an introduction to the foundations of using Stata for data analysis through an applied format. Statistical analyses covered will include descriptive statistics, univariate and bivariate analysis, and basic regression. Students will become acquainted with the basics of cleaning and organizing datasets, completing descriptive analysis, coding, and interpreting results of univariate and bivariate analyses, as well as linear and logistic regression. By the end of the course students will be able to analyze data independently and interpret results. Coursework will include weekly reading, in-class Stata analyses, and completion of a focused course project developed throughout the semester. Course projects will allow students to develop their skill set and experience independently coding in Stata to complete statistical analyses, and interpreting results within the context of strengths and limitations of their data. The final project will also incorporate both literature review and developing a research question that can be analyzed using existing data.

19226 Regression Analysis Using Stata. *3 credits.*

This course will provide an introduction to the foundation's regression through hands-on training in advanced regression techniques using Stata. Statistical analyses covered will include multiple linear regression, analysis of variance, logistic, polytomous, and ordinal logistic regression, and mixed models. Students will become acquainted with the basics of coding and interpreting results of regression analyses, as well as diagnostics to confirm correct model fit. By the end of the course students will be able to conduct regression analyses independently and interpret results. Coursework will include weekly reading, in-class Stata analyses, and completion of a focused course project developed throughout the semester. Course projects will allow students to develop their skill set independently coding in Stata to complete statistical analyses and interpreting results within the context of strengths and limitations of each test. The final project will also incorporate both literature review and developing a research question that can be analyzed using existing data.

19230 Qualitative and Mixed Methods. *3 credits.*

Qualitative and mixed methods can be highly useful in the conduct of community-based population health research. This course will provide introductory classroom and field-based learning experience in qualitative and mixed methods research. Students will receive training in the design, implementation, analysis, and synthesis of qualitative and mixed methods.

Emphasis will be given to the appropriate uses of commonly used methods in community based health research. Course participation will provide students with the basic foundation necessary to develop a research study using qualitative or mixed method designs. This course is for graduate students in the doctoral degree program for Public and Community Health.

19232 Qualitative Data Analysis. *3 credits.*

This course will introduce students to the analysis of qualitative data in public health research. The aim of the course is to explore the process of transforming various types of qualitative data (interview transcripts, field notes, and other texts) into analyses and interpretations. We will introduce students to various analytic approaches, explore their use, and guide students in applying them to data. The course will explore both theoretical and practical dimensions of qualitative data analysis, including identifying themes, developing, and using codebooks, making systematic comparisons, and building and testing models. Approaches to qualitative data analysis will include grounded theory and content analysis. Students will also be introduced to the use of computer software for coding and managing qualitative data. The course will emphasize the connection between theory and methodology, with particular attention to the relationship between the research question, study design, data sources, analytic approach, and interpretation of results.

19295 Reading and Research. *1-9 credits.*

Approval from Program Director and/or student's advisor required. The course of study for Reading and Research is designed by each student with his/her advisor to focus on readings in literature in the student's field, to build bibliographic resources for the dissertation, and to conduct supervised, independent research. Full-time students enrolled over four years will take an estimated 38-41 credit.

19301 Seminar. *1 credit.*

This is a weekly seminar for students enrolled in the PhD Program in Public and Community Health. Seminars will consist of several types of presentations: 1) faculty presentations on current research, 2) guest presentations of current research, 3) student presentations of literature supporting their research project, and 4) student presentations of current research in progress. A total of seven semester hours are required.

19399 Doctoral Dissertation. *9 credits.*

This course is required for the completion of the PhD degree. The PhD candidate must submit a dissertation based on original research of a high scholarly standard that makes a significant contribution to knowledge in the field of public and community health. Each student is encouraged to draft one or more papers for publication in a peer-reviewed journal describing results of the research.

Required Courses as Needed

19003 Doctoral Dissertation Continuation. *0 credits.*

This is a form of registration available to students who have completed all of the required coursework, including dissertation credits but have not yet completed the writing of the Dissertation. Continuation status is limited to three consecutive terms following the completion of Dissertation credits.

Elective Courses

Three elective courses at 3 credits each.

19210 Health and Medical Geography. *3 credits.*

Geography and physical and social environments have important implications for human health and health care. This course will explore the intersections among geography, environments, and public health, with an emphasis on geographical analysis approaches for health data, to address two key questions: (1) How can concepts from geography help us to better understand health and well-being? (2) How can geographic tools, such as Geographic Information Systems (GIS) be used to address pressing questions in health and medical research? Students will become acquainted with theories and methods from health and medical geography through readings, discussion, Geographic Information Systems (GIS) laboratory exercises, and the completion of a focused course project. Throughout the semester we will use the concepts and techniques of the discipline of geography to investigate a variety of health-related topics, and laboratory exercises will center on common health and medical geography research questions. Course projects will allow students to develop a deep understanding of the geographical nature of a health problem of their choosing and will incorporate both literature review and the analysis of geographical data.

19220 Infectious Disease Epidemiology. *3 credits.*

The Infectious Diseases Epidemiology course will provide graduate students a global understanding of infectious diseases from an epidemiological and public health perspective. We will start with a historical perspective of epidemiology (e.g., John Snow, Typhoid Mary). Then we will discuss general principles of infectious diseases such as temporal trends, seasonality, carriers, incubation period, and main modes of transmission. Basic concepts in microbiology as well as microbiological tools currently available will be described. Similarly, basic concepts in immunology required to understand the mechanisms of actions of vaccines will be provided. These topics will then be followed by a more detailed description of key pathogens grouped by the route of transmission. This will include pathogenesis, control, and global burden of disease.

19229 Survey Research Methods. *3 credits.*

Survey Research Methods is a graduate-level, 3-credit hour course that introduces students to the broad concepts of survey design, conduct, and analysis. Students will gain a detailed and comprehensive understanding of questionnaire design, sampling, data collection, survey nonresponse, and analysis of survey data. The course will include lectures, reading assignments, class discussions, individual and group presentations, and exams.

19250 Human Health Risk Assessment and Environmental Health Literacy. *3 credits.*

The course will provide a foundation in Human Health Risk Assessment (HHRA) as it is described by United States Health Agencies: The National Research Council, the Agency for Toxic Substances and Disease Registry, and the Environmental Protection Agency. This foundation will then contextualize the emerging field of Environmental Health Literacy (EHL) which is a hybrid of Risk Assessment and Health Communication. EHL thusly draws from well established methodologies and theories to tackle difficult issues in translational science. Students will gain a detailed comprehension of the historical development of environmental science and how this set of disciplines have integrated with health science. The course will begin with a primer on the philosophical foundations of environmental science by considering late 19th and early 20th century thinkers with accompanied readings. Next, the course will review basic principles of Risk Assessment (with a focus on Human Health Risk Assessment) from the perspective of addressing federal policy. This will lead into some case studies to illustrate the contribution of scientific research to the policy-oriented topic of Risk Assessment. Finally, students will obtain an overview of environmental policy and participate in discussions and assignments that elucidate this important interface between science and society. Students will be evaluated via a midterm exam (20%), a final exam (20%), participation in discussion and organized class debate-styled actives (20%), an oral presentation (20%) and a written essay (20%).

19290 Critical and Analytical Writing. *3 credits.*

Critical and Analytical Writing provides hands-on training, practice, and feedback in the construction of clear, well-written documents and arguments. With a focus on critical analysis and rhetorical situations, the successful student will be able to write effectively to any audience. Interactive sessions and structured assignments highlight the importance of developing these skills you will use throughout your professional life.

Beyond electives offered at MCW, students may complete electives available at MU, or UWM. To ensure rigor and relevancy, the choice of electives is contingent upon approval by the student's major advisor and faculty teaching the courses. Courses must be at the graduate level.

Public Health, Certificate

Program Description

This completely online program is designed for individuals interested in pursuing or further developing a career in public health. Coursework consists of four major disciplines of public health (12 credits). All credits offered in the certificate program may be transferable to the Master of Public Health program within one year of certificate completion.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has no additional specific requirements.

Credits Required to Graduate 12 credits

Required Courses

18155 Public Health Theory & Practice. *3 credits.*

This course provides an overview of various theories in public health, as well as, how public health theories can be applied in individual, interpersonal, and community settings. The course will highlight various factors that contribute to public health, including biological, family, ethnic and cultural, and community stressors that affect health and well-being. The course will provide an overview of translating research into public health practice.

18165 Principles of Public Health Data and Epidemiology. *3 credits.*

This course examines public health data and epidemiological concepts, including foundations of epidemiology, practical applications of public health data and epidemiology, core measures in public health, descriptive epidemiology, sources of data, study designs and data analysis, communicating data, informatics, disease transmission and prevention, morbidity and mortality, , screening tests, infectious disease causation, environmental health, and social, behavioral, and psychosocial epidemiology. The course emphasizes practical application of concepts and skills learned related to accessing, analyzing, and communicating public health data. The course provides the student with an understanding of the distribution and determinants of health and disease in population groups. The course provides the foundation for many other courses in the MPH program.

18203 Public Health Administration. *3 credits.*

Public health professionals require administrative skills at many levels, from managing personnel and health programs, to making and advocating for organizational and policy decisions regarding the distribution of society's scarce public health resources. This is a survey course designed to introduce 1) the structure, functions, and financing of public health within the context of the U.S. healthcare system and its health policies; 2) the planning, implementation, management, and evaluation of programs to improve health; and 3) principles of effective finance, budgeting, grant-writing, and management strategies. In addition to tutorials, readings and case studies, students will complete assignments that are aligned with their own communities, organizations, and professional roles.

18204 Public Health Analytics. *3 credits.*

The use of descriptive and analytical statistics in research studies, with an emphasis on understanding statistical reports and judging the appropriateness of statistical applications reported in the literature. Calculations of statistics are included as a means to understand the appropriate use of statistics.

Public Health, Doctor of Public Health

Program Description

This is the first online DrPH program in Wisconsin designed to prepare experienced public health practitioners with the competencies needed to lead community health improvement efforts. The program is a cohort model in that the students will work together over the course of three years. This will enable the students to work on problems together, and to challenge one another in an environment built on trust. Forty-six credits encompass applied course work culminating with successful defense of the dissertation. The curriculum is a "hybrid" in that synchronous and asynchronous online learning will occur in addition to three summer visits for on-campus learning. Training will be self-directed, faculty and dissertation advisor guided, and cohort influenced. Academic relationships and community partnerships developed through this program will support success in the short term and over the course of a career.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has no additional specific requirements.

A master's degree from an accredited school or program in public health, a master's degree in a related field, a doctoral degree, or a professional degree (e.g., MD, JD, PharmD). Students without a master's degree in public health from an accredited school of public health or program will be required to complete an online core public health course prior to the start of the first semester of the program.

At least three years of post-graduate experience in public health, healthcare, or a related field with management or leadership responsibilities is required.

Students must commit to attend three onsite summer visits and participate in synchronous sessions at designated times.

Credits Required to Graduate 46 credits

Required Courses

28106 Introduction to Community Engagement. *3 credits.*

The course is designed to prepare students to apply translational knowledge and skills in community-based settings. Involving and collaborating with community in bi-directional manner are vital concepts to improving public health and the health of communities. This course provides students with the foundation for understanding communication engagement (CE) and community engagement in research (CEnR), based on principles of community based participatory research (CBPR).

28150 Research Theory. *3 credits.*

This is the fourth required course in the Doctor of Public Health (DrPH) curriculum and provides the students with the basis to go deeper into strategies needed by the Chief Health Strategist. In particular, the students will work on practices one, two, four, five, six and seven, and the strategies and practices will give the students the ability to develop a theory that can be applied to research on public health issues important to their communities.

28151 Data Collection and Analysis. *3 credits.*

The overall goal of the course is to provide the students with an opportunity to read, critically reflect, actively discuss, and write on the research methods and analyses related to public health, including quantitative, qualitative and mixed method approaches. The materials in this course provide a basis of understanding concepts, theories, and applications critical to public and community health in the context of applied research, analysis, and data management.

28152 Executive and Organizational Leadership. *3 credits.*

The course takes a broad look at leadership within public health practice. An introduction to theoretical and evidence-based research is applied to a wide range of public health challenges. Learners will apply knowledge and personal experiences to newly focused leadership understanding through application to practice. Leadership theory and research will connect to core public health practices of assessment, policy development and assurance.

28153 Executive Communication in Public Health. *3 credits.*

This course is designed to explore the ways that communication impacts people's health and well-being, as well as their understanding of health-related topics by bridging theory and practice of interpersonal, organizational, and mass communication (including digital media). The use of communication strategies to inform and influence individual, community and policy level decisions that impact health will be discussed with an emphasis on cultural competency skills in order to understand, respond, and work with diverse audiences.

28160 Public Health Research Study & Design. *3 credits.*

The overall goal of the course is to provide students with an opportunity to identify features of public health research and apply those features to areas of interest by the student. The materials in this course provide a basis of understanding concepts, theories, and applications critical to public and community health.

28170 Public Health Applied Research. *3 credits.*

The overall goal of the course is to provide the students with an opportunity to read, critically reflect, actively discuss, and write on the issues related to public health. The materials in this course provide a basis of understanding concepts, theories, and applications critical to public and community health in the context of applied research. The students will develop knowledge and training the area of research and data management.

28201 Public Health Practice I: Building a Foundation for Public Health. *3 credits.*

The overall goal of the course is to provide the students with an opportunity to read, critically reflect, actively discuss, and write on the issues related to public health. The materials in this course provide a basis of understanding concepts, theories, and applications critical to public and community health.

28202 Public Health Practice II: Building Community Partnerships and Coalitions. *3 credits.*

The overall goal of the course is to provide the students with an opportunity to read, critically reflect, actively discuss, and write on the benefits of building community partnerships and coalitions. The materials in this course provide a basis of understanding concepts, theories, and applications critical to public and community health.

28203 Public Health Practice III: Strategies to Eliminate Health Disparities. *3 credits.*

The overall goal of the course is to provide the students with an opportunity to read, critically reflect, actively discuss, and write on the issues related to and that contribute to health disparities. The materials in this course provide a basis of understanding concepts, theories, and applications critical to public and community health and a means for designing solutions.

28301 Doctoral Seminar. *1 credit.*

This is a student-centered, weekly seminar for students matriculating in the Doctor of Public Health Program. The seminar will consist of several types of activities: 1) presentations on content areas by faculty, community organizations, and community and academic partners in collaboration, 2) sessions focused on issues of professional development, 3) sessions focused on specific research skills or methods, 4) workshop and discussion sessions that provide students with a forum for engagement and collaboration around issues of mutual concern, 5) student presentations. A total of 6 credit hours of this course are required for graduation.

28399 Doctoral Dissertation. *1-5 credit(s).*

Prerequisite: All required DrPH courses.

After successfully completing all other coursework, the student must complete a field-based doctoral dissertation that is designed to influence programs, policies, or systems applicable to advanced public health practice. The practice-oriented dissertation must address a research question of the student's design and result in the production of a high-quality written product that demonstrates synthesis of foundational and concentration-specific competencies. Prior to writing the dissertation, the student will develop a dissertation proposal that must be approved by the committee. At the completion of the dissertation, the student will submit the dissertation to the committee at least 30 days prior to the dissertation defense. The student is required to enroll in 10 credits for the dissertation.

Applied Practice Experience. *0 credits.*

DrPH students are required to engage in an applied practice experience in which they are responsible for completion of at least one project that is meaningful for an organization and to advanced public health practice. Relevant organizations may include governmental, nongovernmental, non-profit, industrial, and for-profit settings. The applied practice experience may be completed within a student's own work setting. The deliverable must contain a reflective component that includes the student's expression of personal and/or professional reactions to the applied practice experience. The student will develop a plan under the guidance of the program staff, director, and faculty advisor.

Required Courses as Needed

28003 Doctoral Dissertation Continuation. *0 credits.*

This course is available for students to take only after completing the required 10 credits of doctoral dissertation if additional time is needed to continue dissertation work.

Public Health, Master of Public Health

Program Description

This program allows students the flexibility to pursue graduate coursework online. It provides active learning opportunities through online technologies and interactive methods. Students may choose full or part-time study but should plan to complete the program within 5 years. The curriculum focuses on public health practice and consists of four core courses, six additional required courses, two elective courses, a field placement experience, and a capstone project. Assignments require the application of theoretical concepts to practical situations through case analysis and experiential activities.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has no additional specific requirements.

Credits Required to Graduate 42 credits

Required Courses

18155 Public Health Theory & Practice. *3 credits.*

This course provides an overview of various theories in public health, as well as, how public health theories can be applied in individual, interpersonal, and community settings. The course will highlight various factors that contribute to public health, including biological, family, ethnic and cultural, and community stressors that affect health and well-being. The course will provide an overview of translating research into public health practice.

18160 Racial and Ethnic Inequalities in Health. *3 credits.*

Recommended: General Epidemiology and Basic Biostatistics.

This course will provide students with an in-depth introduction to health disparities and health inequities as they pertain to specific populations in the US that have been historically disadvantaged and systematically deprived of opportunities to achieve optimal health. The course material will also include an overview of social determinants of population health. We will: (i) consider historical and contemporary debates in conceptualizing race and ethnicity, (ii) examine the burden of racial and ethnic disparities in the US, (iii) identify and examine some of the social determinants of health of health and drivers of health inequity and (iv) examine theoretical and practical challenges of developing innovative strategies to eliminate health disparities and achieve health equity.

18165 Principles of Public Health Data and Epidemiology. *3 credits.*

This course examines public health data and epidemiological concepts, including foundations of epidemiology, practical applications of public health data and epidemiology, core measures in public health, descriptive epidemiology, sources of data, study designs and data analysis, communicating data, informatics, disease transmission and prevention, morbidity and mortality, screening tests, infectious disease causation, environmental health, and social, behavioral, and psychosocial epidemiology. The course emphasizes practical application of concepts and skills learned related to accessing, analyzing, and communicating public health data. The course provides the student with an understanding of the distribution and determinants of health and disease in population groups. The course provides the foundation for many other courses in the MPH program.

18203 Public Health Administration. *3 credits.*

Public health professionals require administrative skills at many levels, from managing personnel and health programs, to making and advocating for organizational and policy decisions regarding the distribution of society's scarce public health resources. This is a survey course designed to introduce 1) the structure, functions, and financing of public health within the context of the U.S. healthcare system and its health policies; 2) the planning, implementation, management, and evaluation of programs to improve health; and 3) principles of effective finance, budgeting, grant-writing, and management strategies. In addition to tutorials, readings and case studies, students will complete assignments that are aligned with their own communities, organizations, and professional roles.

18204 Public Health Analytics. *3 credits.*

The use of descriptive and analytical statistics in research studies, with an emphasis on understanding statistical reports and judging the appropriateness of statistical applications reported in the literature. Calculations of statistics are included as a means to understand the appropriate use of statistics.

18209 Community Health Assessment and Improvement. *3 credits.*

Recommended: 18203 Public Health Administration

This course covers the central concepts of community health assessment and improvement. Students will review public health concepts from a public health systems and practice perspective. The course will focus on public health essential services 1 and 2. Students will obtain an understanding of the public health system, community health assessment and the health improvement process using selected frameworks. The course will focus in-depth on learning about the Mobilizing for Action through Planning and Partnerships (MAPP) frameworks and application of selected components to course projects. In addition, this course will provide the foundation for future community health planning and evaluation courses by building on the content of the public health administration course using a public health practice perspective.

18223 Public Health Policy. *3 credits.*

This course will meet the need of MCW MPH students to know and understand the fundamentals of public health policymaking by diverse stakeholders in the process. The course fills gaps in the curricula at MCW. The textbook is Bodenheimer and Grumbach, *Understanding Health Policy: a Clinical Approach*, 6th edition, Lange publisher. Each session has educational objectives and a competency goal, readings and possible videos, a recorded audio slide presentation by faculty, and a discussion question for students addressing the conflicts and challenges in policy development.

18230 Community Health Program Planning. *3 credits.*

Recommended: 18203 Public Health Administration and 18209 Community Health Assessment and Improvement.

Builds on the foundation in health improvement program planning obtained in the Public Health Administration and Community Assessment and Improvement courses. This course will increase the depth and breadth of students' knowledge and skills through a theoretical and application-based curriculum through three modules, including strategic planning, program planning, and leadership competencies to lead planning efforts.

18260 Community Health Program Evaluation. *3 credits.*

The Community Health Program Evaluation course examines the basic topics related to Community Health Program Evaluation including the history of program evaluation; the levels of program evaluation process; qualitative and quantitative measures; data management tools; data analysis methods; quality management; and other contextual issues surrounding program evaluation. This course will incorporate the use of assigned readings, group projects, peer evaluation, online discussions, and exams in order to foster knowledge of material presented in the course, as well as application-based learning in the area of evaluation of community health.

18268 Leadership for the Public's Health. *3 credits.*

Prerequisites: 18203 Public Health Administration. For students with limited public health experience, 18209 Community Health Assessment and Improvement is recommended as a prerequisite.

The course takes a broad look at leadership within public health practice. An introduction to theoretical and evidence-based research is applied to a wide range of public health challenges. Learners will apply knowledge and personal experiences to newly focused leadership understanding through application to practice. Leadership theory and research will connect to core public health practices of assessment, policy development and assurance.

18279 Field Placement Preparation. *1 credit.*

Prerequisites: 18165 Principles of Public Health Data and Epidemiology, 18203 Public Health Administration, 18204 Public Health Analytics, 18155 Public Health Theory and Practice; all required coursework in the Master of Public Health program besides 18280 Field Placement and 18297 MPH Capstone Project recommended.

This course provides the foundation for the MPH Field Placement course, a required culminating experience within the MPH program. In the Preparation course, students will connect with public health organizations and arrange their specific Field Placement project. The course will highlight principles of human subject research as well as community academic partnerships and will help students apply these principles in the development of their project.

18280 Field Placement. *1-5 credits.*

Prerequisites: All required coursework in the Master of Public Health program besides 18297 MPH Capstone Project recommended.

This is a planned, supervised and evaluated applied practice experience that is designed to enhance and complement the student's educational training by providing practical experience in public or private organizations that address significant public health issues. Working with a site preceptor and faculty advisor, students will develop at least two products for an organization that demonstrate public health competency attainment and are relevant to their professional area of interest.

18297 Capstone Project. *3 credits.*

Prerequisites: All other MPH coursework.

The Capstone Project or Integrative Learning Experience is a culminating experience that requires the students to synthesize and integrate knowledge acquired in coursework and other learning experiences and apply theory and public health principles in the development of a master's paper on significant public or community health issue or topic.

Elective Courses

18101 Foundations of Public Health. *3 credits.*

This is a required course for all students enrolled in the MCW MPH dual degree program and is offered as an elective to all other currently admitted MPH students. This course provides an overview of various theories and practices in public health, as well as how public health theories and practices can be applied to the health of populations. Using the public health system as a framework, the course will address core foundational aspects of public health, public health history, 21st century public health practices, the interrelationship between law, government, and public health, and an introduction to public health emergency preparedness and response. The course will also address health determinants and health equity in the practice of public health.

18115 Health Promotion and Disease Prevention. *3 credits.*

Students will learn key concepts through readings, lectures, on-line discussions and written exercises. The latter will allow students to practice designing elements of an HP/DP plan for a population and health problem of their own choosing using each of the theoretical models and techniques presented in the course. This course is an elective in the MPH degree program, the Certificate in Community Health Assessment & Planning program, and the Certificate in Population Health Management program.

18150 Public Health Law and Ethics. *3 credits.*

The Public Health Law & Ethics course examines law as a tool for public health as well as the ethics underlying the practice of public health and how they interact with the ethical principle of justice, which underlies all of law. The course explores law and ethics in public health through readings related to governmental authority with respect to population and the conflict that it can create with individuals' rights. The course focuses on inadequacies of and changes to the law as revealed by the COVID-19 pandemic and the need to realign public health and the law with the ethics of health justice and equity.

18215 Infectious Diseases. *3 credits.*

Emphasizes the practice of public health in the following areas of infectious diseases: surveillance, outbreak investigation and control, and prevention and policy.

18232 Introduction to Population Health Management. *3 credits.*

Provides knowledge and builds competencies to improve population health outcomes as well as patient and provider experiences and to reduce per person costs; themes include leadership in teams, care of populations, health service quality and value, data analysis and reporting, and financial management; competencies include leadership and interprofessional communication, systems thinking, social and behavioral sciences, data management, process and outcome improvement, and policy advocacy.

18241 Health Communication. *3 credits.*

This course is designed to explore the ways that communication impacts people's health and wellbeing, as well as their understanding of health-related topics. The course will cover multiple levels of communication, different communication channels, and the use of diverse communication media and technologies.

18260 Community Health Program Evaluation. *3 credits.*

The Community Health Program Evaluation course examines the basic topics related to Community Health Program Evaluation including the history of program evaluation; the levels of program evaluation process; qualitative and quantitative measures; data management tools; data analysis methods; quality management; and other contextual issues surrounding program evaluation. This course will incorporate the use of assigned readings, group projects, peer evaluation, online discussions, and exams in order to foster knowledge of material presented in the course, as well as application-based learning in the area of evaluation of community health.

18295 Reading and Research. *1-3 credit(s)*.

An independent study course, under public health faculty guidance, to pursue reading and research in an area of specific student interest.

Regulatory Science for Facilitating Ethics Research, Certificate

Program Description

This certificate is designed to explore advanced topics in human subjects' protections relevant to IRB work in the area of ethics, regulations, current topics, and IRB member skills and professionalism. Graduates of this certificate program will be able to specialize in IRB work and research, akin to recent developments in quality improvement, in which faculty and staff have undertaken specialization in their field. Upon completion of this program, graduates will be ready to conduct their own research to advance the field of regulatory science in addition to being better equipped to serve as senior IRB members, perhaps eventually moving into leadership roles. The certificate will enroll a cohort of new students every other year, as the bioethics-based courses will only be offered every other year.

Admission Requirements

In addition to the general Graduate School admission requirements, this program has additional specific requirements.

Criteria for admission include a minimum of 2 years professional experience as a member of an IRB; college and, if applicable, graduate, or professional school grades; commitment to the field of research ethics; and promise in the program's academic areas.

Credits Required to Graduate

12 credits

Program Credit Requirements

The certificate will enroll a cohort of new students every other year, as the bioethics-based courses will only be offered every other year. Therefore, students will take one course per semester to complete the program.

All the courses of the certificate program are offered online. The technical requirements are minimal, i.e., ability to use a web-browser and email. Class discussions and case analyses are conducted primarily in non-real time, so students can participate at their convenience during each week. However, students are paced on a week-to-week basis just as in a campus course. Moreover, the pedagogical capabilities of the online environment enhance the class discussions and allow for individualized instructor feedback, which empowers the learners and makes the courses truly student-centered.

Participants receive a Certificate of Regulatory Science for Facilitating Ethical Research from the Medical College of Wisconsin's Graduate School of Biomedical Sciences upon completion of the four courses. Each course is also worth graduate credit which may be applicable to the Bioethics MA degree.

Required Courses

10207 Introduction to Research Ethics. *3 credits.*

This course provides students with a comprehensive introduction to the ethical issues involved in scientific, animal and human subject's research. After a brief look back at the history of research ethics, students will spend time considering issues that impact research in both the laboratory setting and in the clinical setting. This course provides the necessary research ethics instruction required to satisfy the United States Public Health Service Policy on Instruction in the Responsible Conduct of Research for institutions receiving research funds from the Department of Health and Human Services. (Issued December 1, 2000.)

10226 Regulatory Issues in Human Subject Research Protections. *3 credits.*

There is no question that the fruits of research have fueled medical progress. Yet, the history of research involving human subjects is not unblemished. Federal regulations, based on ethical principles set forth in the Belmont Report, now govern much of the research undertaken in the United States. In this course, we will explore the history and substance of research regulations in the United States, the application of the regulations to specific research issues, and situations where the regulations do not provide clear guidance.

10228 Current Topics in Research Ethics. *3 credits.*

Rapidly evolving scientific and technologic capabilities in medicine combined with an ever increasing demand to translate these scientific developments to the bedside presents new challenges to regulating human subject's research. This course seeks to keep pace with many of these new and emerging challenges, providing students an opportunity to critically examine the ethical and legal implications of these topics. Specific topics for analysis will be drawn from the current medical literature, popular press, and evolving policy guidance.

20262 Mastering Human Subjects Protections: Meetings, Members, and Processes. *3 credits.*

This course is an advanced examination of the concepts, theories, and principles of IRB decision-making designed for experienced (3 years or more) IRB members. The course will consider ways to satisfy regulatory requirements and ethical review for biomedical research with focus, efficiency, and depth. The course will pay particular attention to distinguishing between major regulatory or ethical questions, on one hand, and non-critical questions or change requests, on the other. The course will also review ways that IRB Chairs and IRB members can more quickly illuminate differences of opinion in a way that allows thoughtful committee resolution of controversial impasses.

School of Medicine

Doctor of Medicine

Program Description

The Medical College of Wisconsin's curricula blend the latest technology and active learning with rich medical education traditions. This dynamic approach is designed to cultivate the skills and interests of students while transforming them into a passion for lifelong learning. The MCW experience provides enriching opportunities that prepare students to discover their calling and become a leader in patient care, research and community leadership.

Milwaukee

The Milwaukee campus offers a four-year program with opportunities to explore a wide range of Scholarly Pathways that focus on community health, cellular and molecular research, bioethics and more.

Central Wisconsin and Green Bay

The Central Wisconsin and Green Bay campuses offer both a calendar-efficient three-year curriculum, ideally suited for students seeking a career in a primary care field or psychiatry, as well as a traditional four-year curriculum. Students at the regional campuses participate in the Physician in the Community Scholarly Pathway, linking medical education with the needs of their communities and area organizations.

Admission Requirements Eligibility

To matriculate to the Medical College of Wisconsin, applicants must have earned a bachelor's degree or a minimum of 90 postsecondary credits (excluding AP, IB, CLEP or similar credits). All required credits, including prerequisites, must be earned at a college or university located in the United States (US) or Canada, and accredited by a state, regional or federal accrediting agency. No credit will be given for coursework taken outside of the US or Canada. Individual exceptions may be considered for applicants attending regionally accredited institutions located outside of the US or Canada. *

The [Medical College Admissions Test](#) (MCAT) exam is required of all applicants. Only scores from tests taken within the three-year period prior to matriculation will be accepted. For instance, for 2023 entry, the exam must be taken no earlier than January 2020.

MCW accepts applications from US citizens, US Permanent Residents, and DACA recipients. All applicants must meet the other eligibility requirements outlined above.

All applicants who are not US Citizens must be prepared to submit a Certification of Finances form and provide supporting documentation for the total cost of attendance to the Financial Aid Office after being admitted to the MCW Medical School. This information is not required to complete the application but must be submitted and approved by April 30 of the matriculation year.

Statistical information may be found within the [Medical School Admission Requirements](#) (MSAR) database. The MSAR is a useful resource to browse, search, sort, and compare information about US and Canadian medical schools and programs.

**Acceptable regional accreditation organizations include:*

- [Accrediting Commission for Community and Junior Colleges \(ACCJC\) Wester Association of Schools and Colleges](#)
- [Higher Learning Commission \(HLC\)](#)
- [Middle States Commission on Higher Education \(MSCHE\)](#)
- [New England Commission of Higher Education \(NECHE\)](#)
- [Northwest Commission on Colleges and Universities \(NWCCU\)](#)
- [Southern Association of Colleges and Schools Commission on Colleges \(SACSCOC\)](#)
- [WASC Senior College and University Commission \(WSCUC\)](#)

Prerequisites

While it is recommended that all prerequisites be completed prior to taking the MCAT, completion of the prerequisites is not a requirement to have an application reviewed, be interviewed, or receive an offer of admission. Completion of all prerequisites is a requirement for matriculation and must be fulfilled by June 1st of the matriculation year.

To ensure accurate academic records, all final, official transcripts from every post-secondary institution attended must be submitted directly to the MCW Office of Admissions by June 1st of the matriculation year. Transcripts must come directly from the educational institutions and include posted degrees. The [American Medical College Application Service](#) (AMCAS) does not forward transcripts to medical schools.

All prerequisites must be taken at a regionally accredited college or university located in the United States or Canada. MCW will accept pass/fail grades for coursework, including prerequisites, taken during the COVID-19 pandemic (currently January 2020 – present).

Biology	3-4 credits (1 semester) Advanced Biology <i>Courses such as Anatomy & Physiology, Immunology, Microbiology or Neurobiology will satisfy this requirement.</i>
Chemistry	3-4 credits (1 semester) Biochemistry <i>Provided the course required General and Organic Chemistry as prerequisites.</i>
Physics	6-8 credits (2 semesters) Physics <i>Typically Physics I and Physics II will fulfill this requirement.</i>
Math	3-4 credits (1 semester) Math <i>Statistics is recommended.</i>
English	3-4 credits (1 semester) English <i>May use a writing-intensive course to satisfy this requirement.</i>
Social Science	3-4 credits (1 semester) Psychology or Sociology

- A course in oral communications (speech, interpersonal communication, etc.) is recommended.
- AP coursework will be accepted for the Physics, Math, English, and Social Science requirements.
- CLEP credit will be accepted for the Math, English, and Social Science requirements.

MCAT

The [Medical College Admissions Test](#) (MCAT) exam is required of all applicants. For instance, for 2022 entry, the exam must be taken no earlier than January 2019.

If the MCAT is taken more than once, the Admissions Committee will mix-and-match the two most recent eligible exams to consider the best overall score.

Acuity Insights (Casper Test)

Completion of the [Casper test](#) is mandatory for all MCW Medical School applicants. Casper is an online, open-response situational judgement test which assesses non-cognitive skills and interpersonal characteristics that we believe are important for successful students and physicians. This information will complement other tools we use for applicant screening, evaluation, and review and will further enhance the fairness and objectivity of our holistic review and selection process.

Acuity Insights Assessments offers the opportunity to complete a standardized, multi-part online assessment consisting of [Casper](#) (90-110 minutes) and [Duet](#) (15 minutes). **Though applicants will be prompted to participate in both components, the only required assessment MCW uses as part of the application evaluation is the [Casper test](#) score.** The Admissions Committee will not know who has completed Duet, or be able to review the content, so participation (or lack thereof) in that assessment will not impact applicant's candidacy at MCW. AAMC PREview is not required, nor will it be accepted as a substitute for Casper.

The applicant's application will not be considered complete or reviewed for possible interview selection until MCW has received their Casper test score. This means they must complete the Casper test and select MCW Medical School for distribution before the posted Distribution Deadline. Casper test scores are only valid for one admissions cycle.

Letters of Recommendation

Required Undergraduate Letters: Applicants must submit undergraduate letters of recommendation unless they graduated with their undergraduate degree at least five years ago. Letters must be submitted in one of the following formats:

- Committee letter
- Packet of letters
- Two individual letters from classroom professors, one of whom must have taught biology, chemistry, physics, or a comparable science discipline.

Graduate Letters: It is strongly recommended that applicants currently or previously enrolled in a degree-granting graduate program submit one letter of recommendation from a professor or thesis advisor. Applicants recently accepted to or matriculated in a graduate program are not required to submit a letter. Applicants may elect to submit graduate letters of recommendation for undergraduate letters in some circumstances, or when unable to acquire undergraduate letters.

Optional Letters: Applicants may submit up to three optional letters. These letters are not required. For optional consideration, these should be received by MCW before the application is complete.

- It is strongly recommended that applicants to the MD/PhD (MSTP) or MD/MS program include a letter of recommendation speaking to their ability to become a physician- scientist.
- Letters from Principal Investigators may be submitted as optional letters, but typically cannot fulfill the undergraduate or graduate letter requirements.

Letter Format

- Letters of recommendation must be on official letterhead and signed by the author(s).
- If the letter-writer is a Teaching Assistant, the letter must be co-signed by the Professor of the course.
- It is the responsibility of the applicant to confirm that each letter-writer understands and complies with these requirements.
- Letters of recommendation are accepted via US Postal Service and electronic providers including AMCAS, VirtualEvals, and Interfolio.

Applicants requesting an exception, such as waiving undergraduate or graduate letters, must contact the Office of Admissions at medschool@mcw.edu or (414) 955-8246.

For Dates and Deadlines, refer to the Medical School Academic Bulletin.

Credits Required to Graduate

Credit Hours vary by three and four-year curricula, and by number of electives. A minimum of 154 total weeks of instruction is required of all MCW medical students.

Program Requirements

All MCW medical students must satisfactorily complete the following:

- Required Courses, All Campuses referenced below
- Clerkships (Longitudinal Integrated Clerkships at Central Wisconsin)
- Electives
 - Milwaukee: 6 four-week electives and 1 two-week elective
 - Central Wisconsin: 4 weeks (three-year curriculum) or 16 weeks (four-year curriculum) of two and four-week electives
 - Green Bay: 6 weeks (three-year curriculum) or 26 weeks (four-year curriculum) of two and four-week electives
- One Core Acting Internship
- One additional Core or Non-Core Acting Internship
- One Ambulatory course (except for Central Wisconsin as Ambulatory experiences are part of the Longitudinal Integrated Clerkship)
- Pass USMLE Step 1 prior to the start of the final year
- Pass USMLE Step 2CK
- Pathways
- Continuous Professional Development including Capstone

Required Courses, All Campuses

MCW Phase 1 Courses

Semester 1 Fall Courses

INTE 11101 Foundations of Medicine

The goal of the Foundations of Medicine Block is to establish a strong, broad foundation of basic scientific knowledge to prepare Phase 1 learners for future systems-based units. This block integrates concepts of biochemistry, cell biology, genetics, physiology, anatomy, microbiology, pharmacology and biostatistics to form a wide base of knowledge related to cell and tissue biology, organ systems, patients and communities, which are applied to solve clinical problems in the context of patient-based scenarios. Learning experiences are reinforced with small group discussions, interpretation of molecular diagnostic tests, and laboratory activities.

INTE 11102 Hematology-Immunology

The Hematology-Immunology block is designed to teach medical students the biochemical, genetic and physiological etiology of hematological and immunological pathologies and physiological responses to infection. The course will be anchored by hematopoiesis and concern the biology of hematopoietic stem cell progeny. This will include the physiology and pathophysiology of red blood cells, white blood cells and platelets, and related pathologies including: immune system disorders, autoimmunity, leukemia and lymphoma, and clotting disorders. In addition the course will introduce treatment modalities, including pharmacology, vaccination, transplant and transfusion. The course will be divided into three sections: (i) immunology, (ii) leukemia and lymphoma, and (iii) hematology. Basic science content will be provided in parallel to small group case-based learning sessions and histopathology laboratories, which will be designed to emphasize and expand upon the pathophysiology.

INTE 11103 Musculoskeletal-Skin

MSS will introduce students to the foundational science of muscle, bone and skin anatomy through didactics which will include online pre-work, in class lectures, case-based discussion and lab sessions. Integrated case studies will examine the development, structure and function of skin, skeletal muscle, cartilage, ligament and bone anatomy through examination of pathology, radiology, immunology, cell biology, pharmacology, anatomy, physiology, and developmental biology. Additionally, students will learn about neoplasms, injuries, infections, and degenerative disorders commonly seen for each system. At the conclusion of the unit, students will recognize common skin and musculoskeletal disease states and communicate effectively using accepted anatomical terminology. This course involves pre-work in the form of webcasts, narrated powerpoints, reading assignments and quizzes via Brightspace. Following weekly case discussions, there will be a summative session to ensure students understand the main takeaways from the discussion. Additional opportunities to reinforce major concepts may be available through online quizzes and post-work assignments.

INTE 11104 Gastrointestinal-Nutrition

"The Gastrointestinal and Nutrition block is a five-week course that describes and defines the normal structural components of the digestive system and reviews the physiologic processes of the cells and tissues of those organs. That foundational knowledge of gastrointestinal system functions will be expanded upon to describe the genetic, nutritional, and immunological mechanisms that underlie human gastrointestinal diseases. This course integrates foundational cell and molecular biology, immunology, pharmacology, pathology, anatomy, and physiology concepts to provide learners with an understanding of gastrointestinal system tissue functions. Knowledge of these concepts will also aid learners in recognizing and identifying the presentation and abnormal physiology of gastrointestinal components during various disease states. Learning activities in the gastrointestinal unit include synchronous and asynchronous didactic sessions, gross anatomy, histology, and pathology laboratory sessions, and small group case-based discussions focused on various gastrointestinal pathologies and disease states."

INTE 12100 Launch

Effective clinical skills are one of the essential components of clinical competence. Elements of the early clinical learning include developing competence in history taking, physical exam, written documentation, oral presentation, clinical reasoning, as well as functioning in a health care setting. The course will be structured to align with the foundational science blocks to promote integrated learning. Thread components will also be interwoven throughout. The goal of the Phase 1 Early Clinical Courses is to prepare students to begin their formal clerkship experiences in Phase 2. The goal of Launch is to provide an introduction to basic clinical skills to prepare students to begin seeing patients in the clinical setting. This course includes instruction on the components of a patient encounter; gathering a history of present illness, a medical, surgical, and social history; performing a basic physical exam; and reporting findings to an attending. Students will also be instructed on written documentation/notes. Teaching methods will include large and small group instruction, utilizing videos, simulation and standardized patients.

INTE 12101 Climb 1

Effective clinical skills are one of the essential components of clinical competence. Elements of the early clinical learning include developing competence in history taking, physical exam, written documentation, oral presentation, clinical reasoning, as well as functioning in a health care setting. The course will be structured to align with the foundational science blocks to promote integrated learning. Thread components will also be interwoven throughout. The goal of the Phase 1 Early Clinical Courses is to prepare students to begin their formal clerkship experiences in Phase 2. The goal of Climb 1 is to build upon skills that were introduced in the Launch course. More advanced history taking and physical exam skills will be practiced. In addition, clinical reasoning will take on a larger portion of their learning. Learning will continue to occur by large and small group instruction, utilizing videos, simulation, standardized patients, and monthly graded homework. Students will also be introduced to the clinical environment and explore ways to further their education while keeping the patient at the center of care.

INTE 12103 The Good Doctor 1

The goal of this course is to provide the knowledge, skills and expertise necessary to promote medical student personal and professional identities formed by character and caring and the autonomous practice of human flourishing. This course includes competencies pertaining to character and professional development, ethics, wellbeing, health equity, communication, and interprofessional practice. This course is predominantly for content requiring a degree of psychological safety. This course will be operationalized both through learning communities as well as through large group and small group lecture and asynchronous learning activities. Students will be assessed through brief pre- and post- block quizzes, reflective writing, independent learning plans, 360 evaluations, and OSCE assessments.

PWAY 12201 Introduction to Scholarly Activities

"The Introduction to Scholarly Activities (ITSA) course is designed to introduce new medical students to the Scholarly Pathway and Scholarly Project requirements and options. This course includes a Learning Fair series of events that mimic each pathway's core session and a Project Fair at which upper classmen students present completed or recruiting projects that align with at least one Pathway's goals and competencies. Additional required workshops center on topics related to ethical conduct of scholarly work, human subject research, building personal development/learning plans, successful mentor/advisor relationships, and getting ready for pathway enrollment. This course includes online content accessed via Brightspace so that students can do independent exploration of the pathway topics, competencies, faculty directors, common instructors, and associated project work."

PWAY12701 Physician in the Community-GB

"The Pathway is a two-year longitudinally formatted course with occasional large group seminars (referred to as "core" sessions) and weekly reserved time for self-directed learning. The desired outcomes include increased knowledge and enrichment in content areas not fully explored in the standard curriculum. For example, students will learn essential qualities and behaviors of physicians which are not solely disease-based. The student will engage in learning about not only disease treatment, but health and health interventions, the introduction of the role of the physician in the community, medical ethics, individual, community, population and global health, health disparities, community engagement, and other pertinent topics to physician practice. The Pathway provides support for and emphasis on student scholarship; the scholarly project follows established best practices for student research. Self-directed learning components are based on an Individual Learning Plan, devised between a student and his/her advisor as the student prepares to complete their scholarly project."

PWAY 12801 Physician in the Community-CW

"The Pathway is a two-year longitudinally formatted course with occasional large group seminars (referred to as "core" sessions) and weekly reserved time for self-directed learning. The desired outcomes include increased knowledge and enrichment in content areas not fully explored in the standard curriculum. For example, students will learn essential qualities and behaviors of physicians which are not solely disease-based. The student will engage in learning about not only disease treatment, but health and health interventions, the introduction of the role of the physician in the community, medical ethics, individual, community, population and global health, health disparities, community engagement, and other pertinent topics to physician practice. The Pathway provides support for and emphasis on student scholarship; the scholarly project follows established best practices for student research. Self-directed learning components are based on an Individual Learning Plan, devised between a student and his/her advisor as the student prepares to complete their scholarly project."

Semester 2 Spring Courses

INTE 11105 Cardiovascular

The Cardiovascular block explores advanced normal cardiovascular function and disease in a clinical context. This course includes the relationship of risk factors to common cardiovascular pathologies. As students master the basic knowledge of cardiac muscle anatomy, biology and physiology, they will gain familiarity with clinical cardiac studies and pharmacologic treatment of common conditions affecting the cardiovascular system. Students will demonstrate an understanding of the physiological, biochemical, local and humoral mechanisms in control of the cardiovascular system. Students will describe normal anatomy and histology of the cardiovascular system. Students will learn the pathology, microbiology, and pharmacologic treatment of cardiovascular disease.

INTE 11106 Respiratory

The Respiratory course aims to improve learners' understanding of the foundational science of the respiratory system as it relates to non-pathologic (normal) and pathologic presentation and basic clinical concepts. This course includes normal histology, anatomy, development, physiology, immunology/microbiology, biochemistry, and neuroscience of the respiratory system. This course will also explore the pathology, clinical presentation, and pharmacologic treatment of common respiratory systems disorders.

INTE 11107 Renal

The goal of the Renal block is to integrate foundational science concepts in a clinical context as it applies to the renal and urinary systems using a case-based, multi-disciplinary approach. Learners will make connections between renal development, histology, physiology, and function. This course includes the pathology and clinical presentation of renal injury, glomerular disease, cystic disease, electrolyte disorders, voiding dysfunctions, urinary tract infections, kidney stone disease, renal vascular diseases, and acid-base conditions. By the end of the renal block, learners will be able to discuss kidney structure and function in non-pathological as well as disease states, interpret clinical laboratory testing of renal function, and discuss renal replacement options. Learning experiences include didactics, small group discussions, laboratory activities, self-directed learning, case-based learning, and interactive large group sessions.

INTE 11108 Endocrine-Reproduction

The Endocrine-Reproduction Course examines the anatomy, histology, embryology, biochemistry, physiology, pharmacology, immunology, pathology, and pathophysiology of the major endocrine and reproductive systems - hypothalamic-hypophysiotropic areas, anterior and posterior pituitary, thyroid, endocrine pancreas, parathyroid, gonads, accessory reproductive organs, and the adrenal glands. It explores the development and progression of female and male reproductive systems, including prenatal development, gender differentiation, puberty, and the reproductive and post-reproductive years. Case-based sessions and self-directed learning assignments expand on the basic science principles learned from podcasts and short didactic sessions.

INTE 11109 Neuroscience

The Neuroscience course is designed to integrate foundational science information as it applies to the human nervous system. Learning materials for this course include online presentations of basic science and clinical concepts, case-based discussions, neuroanatomy and gross anatomy laboratory sessions, resources for formative assessment, reinforcement of clinical examination skills and summative assessments.

INTE 12102 Climb 2

Effective clinical skills are one of the essential components of clinical competence. Elements of the early clinical learning include developing competence in history taking, physical exam, written documentation, oral presentation, clinical reasoning, as well as functioning in a health care setting. The course will be structured to align with the foundational science blocks to promote integrated learning. Thread components will also be interwoven throughout. The goal of the Phase 1 Early Clinical Courses is to prepare students to begin their formal clerkship experiences in Phase 2. The goal of Climb 2 is to build upon skills that were introduced in the Launch and Climb 1 courses. Climb 2 will teach more advanced techniques for the CV, Pulm, ENT and GU exams. Students will also learn more advanced communication skills that include motivational interviewing and shared decision making.

In addition, clinical reasoning will take on a larger portion of their learning. Learning will continue to occur by large and small group instruction, utilizing videos, simulation and standardized patients. Students will also be introduced to the clinical environment and explore ways to further their education while keeping the patient at the center of care.

INTE 12104 The Good Doctor 2

The goal of this course is to provide the knowledge, skills and expertise necessary to promote medical student personal and professional identities formed by character and caring and the autonomous practice of human flourishing. This course includes competencies pertaining to character and professional development, ethics, wellbeing, health equity, communication, and interprofessional practice. This course is predominantly for content requiring a degree of psychological safety. This course will be operationalized both through learning communities as well as through large group and small group lecture and asynchronous learning activities. Students will be assessed through brief pre- and post- block quizzes, reflective writing, independent learning plans, 360 evaluations, and OSCE assessments.

Discovery Curriculum Courses

PSYC D1102 Foundations of Human Behavior. *1 credit.*

Foundations of Human Behavior (FHB) will introduce first year medical students (M1s) to normal psychological development across the lifespan, including cognitive, emotional, and interpersonal development. Understanding of typical human development across the lifespan is a critical foundation for the effective and compassionate treatment of patients across the lifespan and impacts every specialty of medicine. The course has two broad aims: 1) ensuring that medical students understand psychosocial, cultural, occupational, and environmental influences on behavior, health and disease processes, and 2) providing a fund of knowledge, skills, and modeling of positive attitudes and professional behaviors toward patients that medical students will use in their M2 Neurology/Psychiatry Unit, M3 clinical clerkships, and lifelong clinical practice.

INTE D2202 Clinical Apprenticeship. *3 credits.*

Each student will be assigned to a weekly clinical experience, during which students will be supervised in the provision of patient care by a faculty member. A competency assessment checklist of core skills will be created and distributed to students and preceptors. Preceptors will observe their students performing these skills during their clinical experience and provide formative feedback. Weekly notifications of classroom topics, including suggestions for clinical correlations that may be applicable in patient care, will be sent to the preceptors to maximize opportunities for direct application, of knowledge. Preceptors will assist the student in identifying a group of patients with whom the student can have more in-depth interactions over time in an attempt to improve the health of these patients.

Opportunities may include chronic disease management, hospital follow-up, medication reconciliation, preventive care, or providing patient education or counseling. Preceptors from multiple specialties will be recruited from both MCW's full-time and volunteer faculty. Students will be assigned to one preceptor (or potentially two preceptors sharing responsibility for one student) to provide continuity and the opportunity for optimal feedback and mentorship. Regular feedback will be solicited from faculty, including questions on student performance, monitoring of the student competency assessment checklist and the program as a whole.

INTE D2204 Bench to Bedside. *3 credits.*

In this course students will learn how to supplement direct patient care experiences during one half-day per week planned activities. Topics will include multidisciplinary (basic science and clinical faculty) case conferences, the normal physical exam with basic science and clinical correlations, and medical ethics and palliative care. As much as possible logistically, topics will be linked to other teaching sessions in the curriculum to provide basic science context to enhance learning and retention. Multiple modalities will be utilized including small group formats, team-based learning, simulation and distance learning such as podcasting and e-learning.

INTE D2205 Foundations of Pathological Processes – Musculoskeletal and Skin. *4 credits.*

In this course students will learn about the unit, Foundations of Pathologic Processes (FPP) Musculoskeletal/Skin (MSS), which is five weeks in length and has two components. The first component, FPP, provides an introduction to the fundamental principles of Pathology while the second component, MSS, will extend your understanding of the musculoskeletal and integumentary systems by understanding how the biochemical, microbiological, physiological, developmental and anatomical relationships of the musculoskeletal and integumentary systems relate in both the normal and pathologic states.

INTE D2206 Gastrointestinal/Nutrition. *4 credits.*

In this course students will learn about the diseases of the digestive system (gastrointestinal tract, liver, gall bladder and pancreas) including its anatomy, histology, cell and molecular biology, pathology, pathophysiology, and pharmacology. The GI&N unit provides an overview of diseases affecting the human digestive system. Emphasis is placed on understanding the mechanistic basis of digestive diseases, with a strong underpinning in pathology. The overall goal is to foster development of appropriate skills in differential diagnoses and to gain an appreciation of the diagnostic evaluation of patients. Students will learn how diseases of the gastrointestinal tract and liver interface with other systemic conditions. Clinical approaches to treatment are included and will be used to reinforce pathophysiologic principles.

INTE D2207 Cardiovascular. *4 credits.*

In this course students will learn about advanced normal cardiovascular function and disease in a clinical context. The regulation and pathogenesis of hyperlipidemia and hypertension, major risk factors for cardiovascular disease, will be presented. Students will learn about the relationship of these risk factors to the development of ischemic heart disease, congestive heart failure, valvular heart disease and cardiac arrhythmias. As students master the basic knowledge of cardiac muscle anatomy, biology and physiology, they will also gain familiarity with clinical cardiac studies and pharmacologic treatment of common cardiac conditions. At the end of the course, students will be able to demonstrate an understanding of the physiological, biochemical, local and humoral mechanisms in control of the system. They will be able to describe normal anatomy and histology of the cardiovascular system, as well as the pathology, microbiology, and pharmacologic treatment of cardiovascular disease.

INTE D2208 Endocrine/Reproduction. *4 credits.*

In this course, students will learn about the anatomy, histology, embryology, biochemistry, physiology, pharmacology and pathology of the hypothalamic-hypophysiotropic areas, anterior and posterior pituitary, thyroid, endocrine pancreas, parathyroid, bone metabolism, gonads, accessory reproductive organs, and the adrenal glands. This unit explores the development and progression of female and male reproductive systems as well as the lower urinary tract, including prenatal development, gender differentiation, puberty, and the reproductive and post-reproductive years. Clinical cases throughout the unit reinforce learning and expand beyond the basic science principles learned during interactive lectures and virtual microscope sessions and review of M1 material.

INTE D2209 Renal/Respiratory. *4 credits.*

In this course students will learn about the kidneys in a clinical context through a case-based, multi-disciplinary format. Students will make connections between renal development, histology, physiology, pharmacology and disease. The pathology and clinical presentation of renal injury, glomerular disease, cystic disease and neoplasms will be reviewed. At the conclusion of this course, students will be able to discuss normal renal function and disease states as well as clinical laboratory testing of renal function. This course employs an integrative approach to familiarize students with the normal and abnormal function of the upper and lower respiratory systems. Interactive discussions will be utilized throughout the unit to demonstrate important clinical concepts and studies key to understanding respiratory disease. After completing this course, students will understand basic concepts such as lung compliance, airway resistance, ventilatory responses to hypercapnia and hypoxia, and be able to apply these concepts to understand normal respiratory responses to sleep and exercise, as well as pulmonary disease states.

INTE D2210 Neurology/Psychiatry. 4 credits.

In this course students will learn about the knowledge and skills required to understand and evaluate normal function and pathology of the human nervous system. Students will study the anatomy, biology and function of the central and peripheral nervous and psychiatric systems as they explore the diagnosis, pathophysiology and treatment of neurologic diseases. Upon completion of the module, students will achieve a better understanding of the structure and function of the human nervous and psychiatric system, be familiar with common presentations and treatments of major neurologic conditions and be able to perform a neurological and psychiatric assessment.

INTE D2211 Hematology/Lymph. 3 credits.

In this course students will learn about the pathophysiology of red blood cell, white blood cell, platelet, hemostatic, and lymph node disorders. This course will begin with an introductory session on blood and bone marrow histology and review blood cell function. Throughout the course, students will learn about the diagnosis, pathophysiology including genetic and molecular mechanisms, clinical and laboratory presentation, and treatment of the most common hematologic disorders. At the end of the unit, students should be able to demonstrate an understanding of nutritional, hypo proliferative and hemolytic anemias; leukocytosis, myeloid neoplasms, acute and chronic lymphoid leukemia's lymphomas and reactive lymphadenopathies; and bleeding and thrombotic disorders. Various interactive and didactic teaching modalities will be used by basic science and clinical faculty.

INTE D2212 Symptoms. 4 credits.

In this course students will develop skills leading to the integration of basic science courses, history and physical findings, knowledge of clinical correlations and understanding of demographic and psychological factors influencing patient presentation and treatment, through a clinical symptom-based process. This course employs lecture, large group discussion and interactive small group exercises to encourage students to bring together what they have learned about normal and abnormal gross and cellular structure, biochemistry, physiology, neoplasia and the role of microorganisms in each of the organ-based units. Students then apply this knowledge in patients presenting with a particular symptom. A primary purpose of the Unit is to facilitate the transition in student thinking to the style that is required as they start their clinical clerkships. The Unit will continue to build on the early clinical medicine exposure of the student and help relate the clinical knowledge back to important basic science concepts as part of preparing them for their clerkships. Students will examine selected symptoms from both the clinical and basic science viewpoints. The purpose of this approach is to enhance the breadth and depth of a student's knowledge, not only needed for their clerkships, but also as they prepare for their Step 1 USMLE. Upon successful completion of the Symptoms Unit, students will be able to list at least five possible diagnoses for presented symptoms, identify and discuss basic medical science principles causing a symptom, propose appropriate diagnostic procedures and discuss effective treatments for both the symptom and disease states likely to have caused it.

INTE D2213 Foundational Capstone. 3 credits.

In this course students will learn via clinical learning activities designed to prepare students for the USMLE Step 1 Exam and clinical clerkships. Topics and teaching modalities will be similar to those included in the supplemental clinical medicine experiences in the second and third semesters. This will also be a time when students can satisfy checklist items not observed during the direct patient care experience. Additionally, simulated patientcare encounters with follow-up clinical reasoning and oral presentation exercises will be utilized to ensure each student is prepared for clinical clerkships. Students will be introduced to core duties and roles of health care professionals "and the health care system as a whole" as it relates to M3 clerkships.

Milwaukee Discovery Curriculum

M1 Year

MCW-Milwaukee Curriculum Schedule and Course Descriptions

Discovery Curriculum MCW-MKE 4 Year

M1 Fall												M1 Spring											
July	August	September	October	November	December	January	February	March	April	May	June												
Orientation	Clinical Human Anatomy					CHA*	Infectious Ag		ents & Host Immunity			Summer Research or Summer Break											
	Molecules to Cells: Biochemistry, Genetics, Human Development, Cell & Tissue Biology					FHB**	Principles of		Drug Action														
	Physiology					Medical Neuroscience																	
	Foundations of Clinical Medicine					Bench to Bedside																	
	Scholarly Pathways					Clinical Apprenticeship																	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41																							

*Clinical Human Anatomy **Foundations of Human Behavior
38 instructional weeks

Course Key
Basic Science Courses
Clinical Courses
Early Clinical Course
Scholarly Pathways

154 total weeks of instruction

M2 Year

MCW-Milwaukee Curriculum Schedule and Course Descriptions

Discovery Curriculum MCW-MKE 4 Year

M2 Fall												M2 Spring											
July	August	September	October	November	December	January	February	March	April	May	June												
Summer Research or Summer Break	Foundations of Pathological Processes-MSS*		Cardio-vascular	Renal-Respiratory	Heme-Lymph	GI-Nutrition	Endo-Repro	Neuro-Psych	Symptoms		USMLE Study/Exam												
	Bench to Bedside					Foundational Capstone																	
	Clinical Apprenticeship																						
	Scholarly Pathways					Scholarly Pathways																	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38																							

*Musculoskeletal Skin
35 instructional weeks

Course Key
Basic Science Courses
Clinical Courses
Early Clinical Course
Scholarly Pathways

154 total weeks of instruction

M3 Year

MCW-Milwaukee Curriculum Schedule and Course Descriptions

Discovery Curriculum MCW-MKE 4 Year

M3 Fall												M3 Spring																							
July			August			September			October			November			December			January			February			March			April			May			June		
Block A						Block B						Winter Break Interession			Block B			Block C						Interession											
Surgery			OB/GYN-Anesthesia			Family Medicine			Psychiatry						Pediatrics			Elective			Medicine						Vacation or Elective			Vacation or Elective ²					
Continuous Professional Development																																			
Scholarly Pathways (Application-based)																																			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52																																			

M3 year divided into three 16-week blocks; students will take blocks and rotate through clerkships based on track assignment

Student limited to 4 weeks of vacation in Block C in the 3rd year; 4 weeks of vacation can be deferred to the 4th year

¹ Neurology is required but can be taken in the 3rd or 4th year

² Student has an option to take 4 weeks of vacation in the 3rd year; If not taken in 3rd year, an additional 4 weeks of vacation are available in the 4th year

46 instructional weeks

Course Key

- Basic Science Courses
- Clinical Courses
- Early Clinical Course
- Scholarly Pathways

154 total weeks of instruction

M4 Year

MCW-Milwaukee Curriculum Schedule and Course Descriptions

Discovery Curriculum MCW-MKE 4 Year

M4 Fall												M4 Spring																							
July			August			September			October			November			December			January			February			March			April			May			June		
Elective			Core Acting Internship ¹			Elective			Elective			Vacation or Elective ²			Independent Professional Development ³			Winter Break or Remediation ⁴			Required Ambulatory Rotation ⁵			Acting Internship ¹			Elective			Vacation			Capstone ⁶		
Continuous Professional Development																																			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46																																			

4th year is divided into ten 4-week blocks and schedule is based on student lottery

*Indicates required course in 4th year

¹ Each student must complete two acting internships, at least one of which must be a "Core Acting Internship" and may be completed in July or February

² Student has an option to take 4 weeks of vacation in the 3rd year; If not taken in 3rd year, an additional 4 weeks of vacation are available in the 4th year

³ 4-week Independent Professional Development block for USMLE study, remediation and/or residency interviews

⁴ 3-week Winter Break/Remediation and Capstone blocks are fixed in the schedule

35 instructional weeks

Course Key

- Basic Science Courses
- Clinical Courses
- Early Clinical Course
- Scholarly Pathways

154 total weeks of instruction

Acting Internships Core

FMED D4502 Family Medicine Core Acting Internship. 4 credits.

In this course students will learn to: -- Independently complete an initial assessment of the patient and his/her problems at the conclusion of the sub-internship experience. -- Manage the short-term needs (overnight) of the acutely sick patient. -- Diagnose and implement an inpatient plan of care and therapy based on assessment of risks/benefits of available therapies, as well monitor outcomes for his/her patients. Mutually Exclusive Course. See Mutually Exclusive Course List: <https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

FMED D4504 Family Medicine Core Acting Internship. *4 credits.*

During this course, students will learn about the role of family physician in an inpatient family medicine team at Froedtert Menomonee Falls Hospital. Students will have an opportunity to gain core knowledge regarding basic interviewing and technical skills needed by a generalist physician in evaluating, diagnosing, and managing adult hospitalized patients, newborns and obstetric patients. Students will be exposed to the broad scope of family medicine in the hospital setting. Mutually Exclusive Course. See Mutually Exclusive Course List:

<https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

FMED D4510 Family Medicine Core Acting Internship. *4 credits.*

This will be an advanced experience in Family Medicine focusing on hospital care of Family Medicine patients including adults, pediatrics, ICU, NICU and obstetrical patients. Mutually Exclusive Course. See Mutually Exclusive Course List:

<https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

FMED D4512 Family Medicine Core Acting Internship. *4 credits.*

Join a Family Medicine inpatient team at St. Joseph Hospital consisting of two interns and a senior resident as a valued member of the team and having the experiences and supervision responsibilities of an intern. Activities mirror the interns including but not limited to patient rounds, handoffs, admitting appropriate admissions, dictating histories and physicals, and being available for all team concerns. Student will be expected to be first member of team to access patient admission and develop plan when possible. No call requirements but shortened hospital work with team on two Sat/Sun weekend period rotations. Presently minimal opportunities for procedures on this medical service and unlikely to have junior medical students in hospital to supervise/teach. Mutually Exclusive Course. See Mutually Exclusive Course List:

<https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

MEDI D4500 Medicine Core Acting Internship. *4 credits.*

This course provides inpatient experience in Internal Medicine on General Internal Medicine floors. Students enrolled in this course will be acting interns on the General Internal Medicine ward teams at an assigned site. Primary patient care experiences (admissions, cross-coverage, daily evaluation/treatment, discharges) will be supplemented by scheduled didactic and patient simulations.

MEDI D4531 Inpatient Cardiology Core Acting Internship. *4 credits.*

The four-week M4 Inpatient Cardiology Acting Internship covers the diseases of the cardiovascular system, including its anatomy, physiology, pathophysiology, pharmacology and acute care management. Our clinical patient experience from 3NW and CVICU units provides a wide spectrum of diseases affecting the human cardiovascular system. Emphasis is placed on understanding the cardiovascular pathophysiology, and using this to logically guide evaluation, diagnosis and treatment decisions.

Upon completion of this rotation, you will have developed excellent skills in examination, differential diagnosis, diagnostic evaluation and clinical care of acutely ill cardiovascular patients. You will have a much better understanding of how diseases of the cardiovascular system interrelate with other systemic conditions. Direct patient care and management will allow students to develop exceptional skills needed to be successful during Internship and beyond. Students preparing for medical, emergency or neurologic oriented residencies will find this course particularly useful in preparation for their internship.

MEDI D4532 Medical Intensive Care Unit Core Acting Internship. *4 credits.*

This critical care rotation will expose students to a broad array of experiences in the care of the critically ill and injured patient. The rotation is based in the Medical Intensive Care Unit located on the 6th floor of the North Tower (NT) in the Froedtert Hospital Building. Patients on the MICU service will occasionally be located outside the primary confines of the MICU (in other ICUs such as the surgical intensive care unit); the MICU service has primary responsibility of all patients on its service regardless of location. You may be assigned responsibility of a patient outside of the physical confines of the MICU. The MICU service has two independent teams (MICU 1 and MICU 2). Each team is staffed by a faculty member and comprised of 5 residents, one fellow and 1-2 advanced practice providers. Prior to the start of your rotation, you will be assigned a particular team along with the name of the fellow and attending physician on your team. Mutually Exclusive Course. See Mutually Exclusive Course List:

<https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

OBGY D4514 Gynecology Oncology Core Acting Internship. *4 credits.*

Surgical acting internship where student is involved in the outpatient and inpatient gynecology oncology service. The student works within the framework of the resident team and faculty on staff. There is a PGY2 and PGY3 on service at the same time and the M4 serves as the intern on the service. Student participates in all aspects of service inpatient care, outpatient care, surgical procedures, conferences, journal club and students are expected to participate in some weekend call. There is a pre and post rotation online evaluation with the rotation.

Students' overall evaluation is based on the completion of assignments, the resident team's assessments, the faculty's assessments, preparedness while on service and active participation while on service. Mutually Exclusive Course. See Mutually Exclusive Course List:

<https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

PEDS D4501 General Pediatric Core Acting Internship. *4 credits.*

In this course, students will care for a variety of pediatric patients in the inpatient setting on a team with attending's, fellows, residents, interns and other students. The student will have the opportunity to assume the role and responsibilities of an intern with appropriate supervision. The student will manage their own panel of patients (performing H&Ps, developing differential diagnoses, and treatment plans), coordinating care for after discharge, speaking with consultants and providing cross coverage when on call. The student will learn to identify patients who need more urgent needs addressed.

SURG D4503 General Surgery Core Acting Internship at VA Medical Center. *4 credits.*

1) Sub-interns will participate in the assessment and management of common "bread and butter" as well as unusual General Surgery diagnoses. Patients in various risk categories present to the VA for evaluation of their general surgical problems, often at later stages of their disease course. There is additional emphasis on coordinating care of patients with Geriatrics, Mental Health e.g., Post traumatic stress, severe depression, and Intensive Care Diagnoses, where we co-manage our patients with the respective teams. 2) We expect sub-interns to complete an independent initial assessment and formulate a diagnosis & plan of management for routine admissions and acute surgical consultations. 3) Sub-interns will implement appropriate therapy, monitor the effectiveness of treatment plan, coordinate care and communication with consult services, attend all relevant procedures performed on the patients, provide electronic documentation and interact with patient and family members in an appropriate manner under the supervision of a senior/chief resident and faculty. It is expected that the sub-intern will develop the organizational skills to manage several patients by the end of the rotation. 4) Sub-interns will participate in the longitudinal care of surgical patients while participating in the outpatient clinics twice a week. 5) Sub-interns will be offered the elective opportunity to participate in the development of an educational curriculum, research project or case report while rotating on our service, if desired.

SURG D4513 Trauma Surgery Core Acting Internship at Froedtert Hospital. *4 credits.*

Injury prevention and care have an enormous impact on society. This course provides the student with an experience in diagnosing, managing, and caring for patients suffering from various injuries at Froedtert Memorial Lutheran Hospital, the only Level One Trauma Center in Southeastern Wisconsin. The student will join a team of acute care surgeons and nurse practitioners caring for patients presenting to Froedtert Hospital with a wide array of injury related conditions after falls, motor vehicle crashes, penetrating trauma, and personal assault. The student will have the opportunity to evaluate patients acting at the intern level when performing patient assessments and recommending treatment. In-house resident and faculty provide direct supervision. Clinical responsibilities will include taking overnight call, seeing consults, rounding on patients, and attending required didactic sessions and conferences. This rotation will provide students with an understanding of the role of the healthcare provider in the prevention, diagnosis and management of a wide variety of injuries.

SURG D4514 Surgical Intensive Care Unit Core Acting Internship. *4 credits.*

The medical student will function as a junior member of the SICU team. The student will admit 1-2 patients/week and be the primary provider for at least 1 patient each day while working under the supervision of a resident or APP. During this rotation the student will gain familiarity with the management of a critically ill surgical patient. This includes learning how to identify and treat shock, manage fluids and blood transfusions, appropriate indications and use of vasoactive medications and the basics of renal replacement therapy and mechanical ventilation. The student will also gain working knowledge of the techniques used to perform invasive bedside procedures such as vascular access, chest tubes, and tracheostomies. During this month the student will assess and formulate a care plan for each patient under their care.

SURG D4524 Acute Care Surgery Core Acting Internship at Froedtert Hospital. *4 credits.*

Acute Care Surgery is a specialty that encompasses trauma, surgical critical care, and emergency general surgery. In this course, the student will be exposed primarily to emergency general surgery, though opportunities to assess and manage the injured patient will also exist. The student will join a team of acute care surgeons and nurse practitioners who care for patients presenting to Froedtert Hospital with a wide array of emergency general surgery conditions. The most common conditions include abdominal pain, diverticulitis, small bowel obstruction, acute cholecystitis, appendicitis, skin and soft tissue infections, and perforated hollow viscus.

The student will have the opportunity to evaluate patients first and act as an intern in patient assessment and recommending treatment. In-house resident and faculty supervision will be provided. Clinical responsibilities will include taking overnight call, seeing consults, rounding on patients, operating, and attending required didactic sessions. This rotation will provide students with an understanding of the role of a surgeon in managing a wide variety of acute illnesses.

Acting Internships Non-Core

ANES D4615 Anesthesiology Acting Internship. *4 credits.*

The Anesthesiology Acting Internship's goal is to refresh and broaden the knowledge of Anesthesiology gained during the Junior year. Learn advanced hemodynamic monitoring and application of physiology and pharmacology with an emphasis on cardiovascular anesthesiology. This is done with hands on experience in the technical aspects of Anesthesiology, e.g., airway management, tracheal intubation, placement of venous and arterial catheters and management of pulmonary artery catheters, along with understanding the risks and benefits of various anesthetic techniques.

ANES D4626 Anesthesiology for Trauma and Emergencies Acting Internship. *4 credits.*

The student will work as a member of the Trauma Anesthesiology Team and will respond to all emergent intubations and CODE 4 with the anesthesiology staff and the residents. Student involvement begins in the Emergency Department with a "Trauma Alert" page. ****All Students taking this course must have a working pager.**

MEDI D4629 Medical Intensive Care Unit Acting Internship. *4 credits.*

In this course students will: -- Develop a systematic approach to evaluating and treating critically ill patients based on physiology, pathophysiology, and pharmacology. -- Acquire a working understanding of mechanical ventilators, bedside hemodynamic monitors, and other physiologic apparatus -- Develop an appreciation for skills required for endotracheal intubation, arterial catheterization, and obtaining central venous access. Mutually Exclusive Course. See Mutually Exclusive Course List:

<https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

MEDI D4633 Blood and Marrow Transplantation Acting Internship. *4 credits.*

The Blood and Marrow Transplantation Acting Internship is a rotation on the inpatient bone marrow transplantation (BMT) service that manages patients undergoing marrow transplantation or patients admitted following complications of BMT.

MEDI D4634 Hospital Medicine Acting Internship. *4 credits.*

Work with an Internal Medicine Hospitalist team at the level of an intern/first year resident in the role of direct patient care. Interact with patient and learn via: • Patient care experiences o Scheduled didactics/case discussions, incorporating principles of evidence-based medicine. • Become familiar with triage and assessment of common cross-coverage issues (chest pain, abdominal pain, GI bleeding, delirium, seizures, fever, dyspnea, decreased urine output, acid/base disturbances, electrolyte imbalance, hypoglycemia, insomnia, falls, unstable vital signs such as tachycardia, bradycardia, hypotension, hypertension, and hypoxia). • Dictate or type discharge summaries. • Perform procedures; opportunity with supervision to perform ABG, thoracentesis, paracentesis. • Practice communication skills including coordination of patient care discussions with ancillary staff (case managers, social workers, etc.) and discussions with patients and their families regarding diagnoses, evaluation, and treatment options. • Serve as a guide and role model and help teach M3 students and peers on history, physical exam, and case assessment. Mutually Exclusive Course. See Mutually Exclusive Course List: <https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

NEUR D4601 Acting Internship in Neurology. *4 credits.*

The Neurology Acting Internship is a 4-week rotation designed for the fourth-year student to increase their knowledge on how to treat patients with neurological problems who are admitted to the hospital, i.e., act like an intern, as well as have an in-depth education on inpatient Neurology. The rotation consists of 2 weeks on the Neurology Ward Service and 2 weeks on the Neuro Intensive Care Service. Prior completion of the Neurology Clerkship, NEUR-D3300 is required.

NEUR D4628 Child Neurology Acting Internship. *4 credits.*

During the child neurology acting internship, students will be active participants on child neurology consulting team. As first contact provider, they will participate in evaluation and creation of treatment plan on pediatric patients with neurological issues in general floors, pediatric intensive care unit, neonatal intensive care as well as in emergency rooms.

NSUR D4610 Neurological Surgery Acting Internship. *4 credits.*

As an acting internship, students will be expected to focus on their growing their clinical acumen with cares of complex patients involving spinal and cranial issues, trauma, urgent, and elective in nature. Students will complete initial assessments of neurosurgical patients; formulate and document an assessment, diagnosis and treatment plan; and under supervision of the faculty and residents, implement treatment based on assessment of risks/benefits of available options.

OPHTH D4659 Pediatric Ophthalmology and Strabismus Acting Internship. *4 credits.*

This course was designed for fourth year medical students interested in pursuing ophthalmology. The goal is to offer this acting internship in July and August, prior to the application deadline for residency in ophthalmology and serve as a non-core acting internship. This specific 4 week acting internship will be focused on pediatric ophthalmology and adult strabismus. Students will gain core knowledge in the diagnosis and management of patients with many ophthalmic diseases, but with a focus on amblyopia and strabismus. Specific skills which will be introduced or improved in both children and adults will include assessment of visual acuity, pupil exam, assessment of extraocular motility, measurement of intraocular pressure, slit lamp examination, and direct and indirect ophthalmoscopy. The rotation will include clinic experience with both pediatric optometrists and pediatric ophthalmologists. The students will have significant interactions with ophthalmic technicians and orthoptists. There will also be assigned times for experience in the OR. Additionally, students will be encouraged to attend resident didactic sessions and ophthalmology grand rounds. An informal case presentation will be required at the end of the rotation. See Mutually Exclusive Course List: <https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>.

OSUR D4607 Orthopaedic Surgery Acting Internship. *4 credits.*

In this course students will 1) participate in the assessment and management of orthopaedic patients with a full range of diseases and trauma of the musculoskeletal system. 2) carry out an initial assessment of selected orthopaedic patients admitted to the emergency room, surgery or ward, during regular hours. Present this information to the resident and/or staff for development of final management plans and implementation. 3) independently obtain a complete history and physical and develop a management plan for selected orthopaedic patients in an outpatient setting. Present this information to the resident and/or staff for development of final management plans and implementation. 4) To participate in the initial assessment and management of orthopaedic surgery patients while on call with the orthopaedic resident.

OSUR D4616 Pediatric Orthopaedic Surgery Acting Internship. *4 credits.*

This course will provide students with the opportunity to: 1) Participate in the assessment and management of pediatric patients with common orthopaedic conditions such as fractures, gait abnormalities, congenital anomalies, etc. as well as the more complex conditions such as cerebral palsy, spina bifida and scoliosis, etc., 2) Carry out an initial assessment of selected pediatric orthopaedic patients admitted to the emergency room, surgery or ward, during regular hours.

Present this information to the resident and/or staff for development of final management plans and implementation. 3) Independently obtain a complete history and physical and develop a management plan for selected pediatric orthopaedic patients in an outpatient setting. Present this information to the resident and/or staff for development of final management plans and implementation. 4) Participate in the initial assessment and management of orthopaedic surgery patients while on call with the orthopaedic resident.

OTOL D4609 Otolaryngology Acting Internship. 4 credits.

The otolaryngology acting internship is designed to orient senior medical students to the otolaryngology head and neck examination, common inpatient and outpatient pathologic diagnoses, the range of the specialty, and approaches to head and neck diagnosis and treatment. On this rotation students will learn a variety of otolaryngologic conditions and procedures including, but not limited to diagnosis and management of nasal airway obstruction, allergic rhinitis, sinusitis, voice issues, dizziness, hearing loss, cholesteatoma, epistaxis, airway obstruction, head and neck benign and malignant masses, and sleep apnea. Students will spend four weeks split between the otolaryngology services at FH, Children's Wisconsin, and the VA. This course is highly recommended for students interested in gaining a deeper appreciation of the specialty, either intending to enter otolaryngology or a closely related field.

OTOL D4617 Pediatric Otolaryngology Acting Internship. 4 credits.

Each fourth-year student will spend time in both the Pediatric ENT Clinic at Children's Wisconsin and in the ENT operating rooms at Children's Wisconsin. On most rotations, the split between clinical time and operative time is 50/50. Students will be a valuable part of the Otolaryngology service at Children's and are expected to round each day with the pediatric otolaryngology fellow, chief resident and junior resident on the rotation. In addition to spending time in clinic and the operating room each day, the student will be expected to assist with inpatient and ER consultations when available. Overnight call is required. Students will be expected to turn in one history and physical for each night they are on call. Students will also follow any patients who are admitted or consulted on during their call night throughout the patient's hospital stay. The student is expected to attend all departmental teaching conferences with the residents as well as Grand Rounds and monthly morbidity and mortality rounds. Professor rounds with individual pediatric otolaryngology faculty will also be available. A final oral presentation is also expected. The student will take a final written evaluation. The student's final grade will consist of resident/faculty evaluations (33%), history and physicals and final examination (33%) and final oral presentation (33%).

PEDS D4609 Pediatric Oncology/Bone Marrow Transplant Acting Internship. *4 credits.*

This course is designed to provide senior medical students with intern-level responsibilities in the inpatient care of pediatric oncology and pediatric bone marrow transplant patients. Students will participate in the initial diagnostic workup for new oncology patients, following 2-4 patients on a daily basis, writing daily progress notes, presenting patients on family-centered rounds, formulating daily plans, communicating with consult services, and performing inpatient oncology consults. Students will participate in the didactic teaching program with the residents on the rotation. Students will be exposed to the concepts of chronic immunosuppression, chemotherapy management and side effects, patient education, and palliative care in order to gain a broad understanding of the management of pediatric cancer. Other unique experiences may include involvement in procedures such as bone marrow aspiration/biopsies and lumbar punctures. In order to provide experience in patient cross-coverage and acute care management, students will participate in night float coverage during one week of their rotation.

PEDS D4625 Neonatal Intensive Care Unit Acting Internship. *4 credits.*

Students in this course will: 1) attend deliveries to learn newborn resuscitation 2) recognize and manage sick newborns with respiratory, cardiac, metabolic or surgical problems. 3) integrate clinical assessment and lab data to formulate management and therapeutic plans for critically ill patients. 4) learn to distinguish and prioritize between the critically ill patient who needs intervention now from the patient with less acute needs. 5) recognize and manage the special problems of premature infants. 6) gain an understanding of the appropriate roles of the general pediatrician and neonatologist in preterm care.

PSYC D4612 Psychiatry Acting Internship. *4 credits.*

This elective is a sub-internship. Expected to carry 3-4 cases, write all the notes, orders etc. Follow other patients on the team and work under direction of attending. Emphasis is on learning how to run an inpatient service as well as how to do a better psychiatric interview.

RADI D4619 Vascular & Interventional Radiology Acting Internship. *4 credits.*

Interventional Radiology is a surgical sub-specialty of Radiology where emphasis is placed on treating patients using the least invasive approach to minimize the risk to the patient and improve patient health outcomes. Minimally invasive image-guided procedures are relied upon for diagnostic and therapeutic purposes and can be applicable to virtually every organ system.

This Acting Internship will allow students to utilize the knowledge gained in their internal medicine rotations to help with inpatient consults to evaluate the type and need for procedures. In addition, students will use the technical skills gained on their surgical rotations to help perform procedures in interventional radiology. In order to achieve this, students will be assigned to follow inpatients from initial contact with IR to discharge home. They will be the primary contact for these patients, will write initial consultation notes, participate in all procedures, peri-procedural care, write progress notes and attend daily rounds on their patients. PLEASE NOTE: Based upon combined enrollment counts for all VIR medical student electives, it may be possible to open up additional spots even if the course is listed as full. If you would like to request this accommodation, please contact Mandy Stadler (course coordinator) at astadler@mcw.edu.

SURG D4601 General and Vascular Surgery Acting Internship. *4 credits.*

In this course students will --serve as the primary contact for selected surgical patients presenting to the emergency room, ambulatory surgery, or admitted to the ward during regular hours. --serve as the primary contact for selected patients presenting to the surgical service or consults, while on night-call. --participate in the management of the surgical patients while on call with the chief resident. --independently complete an initial assessment of selected surgical patients, complete history and physical, and develop a management plan. --present this information to the chief resident and/or staff for development of final management plans and implementation.

SURG D4605 Cardiothoracic Surgery Acting Internship. *4 credits.*

This course is intended for students desiring more in-depth knowledge of surgical diseases of the chest, both pulmonary and cardiac, as well as esophageal. It is designed for students seeking a surgical career, as well as students who desire more specialized exposure to thoracic diseases for all professional goals. In this course students will --learn principles of pre- and post-operative care of cardiothoracic surgery patients. --learn about disease processes of the heart, lungs, airways, esophagus, mediastinum, pleura and chest wall, and to learn indications for cardiothoracic surgical procedures. --learn about diagnostic studies used in cardiothoracic surgery. Mutually Exclusive Course. See Mutually Exclusive Course List: <https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

SURG D4618 Pediatric Surgery Acting Internship. *4 credits.*

In this course the student will --participate in the evaluation and management of a wide range of general and thoracic surgical problems in infants, children and adolescents. Such problems include common and unusual congenital anomalies, tumors, trauma, burns, and inflammatory conditions. There is a wealth of pathology with special emphasis on embryology and its relationship to anatomy and surgical conditions. -- gain education in writing H&Ps, orders, daily notes, and discharge planning. They will develop and monitor treatment plans. They will evaluate results of diagnostic testing. They will participate in communication with the family and other health care professionals. Activities include both Inpatient and Outpatient settings. Students will have many opportunities for direct Staff-to-Student instruction.

SURG D4620 Transplant Surgery Acting Internship. *4 credits.*

1) To understand the management of patients with end stage kidney and liver disease. To appropriately evaluate treatment options for patients with end stage kidney or liver disease, including dialysis and transplantation focusing on risk benefit assessment and potential associated morbidities. 2) To participate in the hospital care of patients with end-stage renal and liver disease both pre- and post kidney or liver transplantation with a focus on pathophysiology including fluid and electrolyte disorders. 3) To participate in the hospital care of patients with renal failure requiring dialysis. 4) To serve as primary contact for all transplant surgical patients admitted to the floor during call periods with supervision by senior residents or faculty and to have initial responsibility for formulating a diagnosis and plan of treatment. 5) To become familiar with applied transplant immunology focusing on histocompatibility and cross match techniques.

SURG D4622 Vascular Surgery Acting Internship. *4 credits.*

In this course, students will --understand the pathophysiology of peripheral vascular disease and aneurysmal disease. --appreciate role of surgical and less invasive interventions in treatment of above. --gain experience in the in-patient management of frequent medical co-morbidities (CAD, DM). --gain familiarity with out-patient evaluation and decision-making in this population, including the role of the vascular laboratory. --independently complete an initial assessment and formulate a diagnosis and plan of management for vascular surgical consultations. --implement appropriate therapy, monitor effectiveness of treatment plan, and interact with patient and family members in an appropriate manner with supervision of senior resident and faculty.

SURG D4623 Cardiothoracic Surgery Acting Internship. *4 credits.*

This course will provide broad exposure of M4 to the field of adult cardiac surgery in the areas of ischemic and valvular heart disease, arrhythmia surgery, and thoracic aortic diseases. Student will become proficient in evaluation of patient and able to formulate a sound treatment plan for common surgical diseases of the heart. Students will be exposed to and gain experience in general thoracic surgery as well. Mutually Exclusive Course. See Mutually Exclusive Course List: <https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

SURG D4626 General Surgery/Surgical Oncology-Gastrointestinal & Hepatopancreaticobiliary Acting Internship. *4 credits.*

Independently complete an initial assessment and formulate a diagnosis and plan of management for surgical consultations. --implement appropriate therapy, monitor effectiveness of treatment plans, and interact with patients and family members in an appropriate manner with supervision of senior resident and faculty. --learn the appropriate management of surgical patients in the outpatient setting.

SURG D4627 General Surgery/Colorectal Surgery Acting Internship. *4 credits.*

Colorectal Surgery: Emphasis on surgical management of colon and rectal problems such as hemorrhoids, anal fissures, fistulas, diverticulitis, colitis, Crohn's disease, colon cancers, inflammatory bowel disorders and gastrointestinal malignancies. --independently complete an initial assessment and formulate a diagnosis and plan of management for surgical consultations. --implement appropriate therapy, monitor effectiveness of treatment plans, and interact with patients and family members in an appropriate manner with supervision of senior resident and faculty. --learn the appropriate management of surgical patients in the outpatient setting.

SURG D4628 General Surgery/Minimally Invasive Gastrointestinal Surgery Acting Internship. *4 credits.*

Minimally Invasive General Surgery: Emphasis on surgical correction of reflux disease, hernias, gallbladders, bariatric surgery and minimally invasive management of general surgical problems. --independently complete an initial assessment and formulate a diagnosis and plan of management for surgical consultations. --implement appropriate therapy, monitor effectiveness of treatment plans, and interact with patients and family members in an appropriate manner with supervision of senior resident and faculty. --learn the appropriate management of surgical patients in the outpatient setting.

SURG D4629 Surgical Oncology-Breast Surgery Acting Internship. *4 credits.*

Surgical Oncology Breast: Emphasis on surgical management of breast diseases and general surgical problems. --independently complete an initial assessment and formulate a diagnosis and plan of management for surgical consultations. --implement appropriate therapy, monitor effectiveness of treatment plans, and interact with patients and family members in an appropriate manner with supervision of senior resident and faculty. --learn the appropriate management of surgical patients in the outpatient setting.

SURG D4630 Surgical Oncology-Endocrine Acting Internship. *4 credits.*

Surgical Oncology Endocrine: Emphasis on surgical management of endocrine diseases and general surgical problems. --independently complete an initial assessment and formulate a diagnosis and plan of management for surgical consultations. --implement appropriate therapy, monitor effectiveness of treatment plans, and interact with patients and family members in an appropriate manner with supervision of senior resident and faculty. --learn the appropriate management of surgical patients in the outpatient setting.

UROL D4606 Urology Acting Internship. *4 credits.*

This clerkship is designed for students interested in in-depth experience in urology. It is offered to introduce the students to the principles of urologic disease at a more accelerated pace. Prior completion of M3 Urology elective preferred.

UROL D4621 Pediatric Urology Acting Internship. *4 credits.*

This clerkship is designed for students interested in in-depth experience in pediatric urology. It is offered to introduce the students to the principles of pediatric urology at a more accelerated pace.

Ambulatory Courses

ANES D4904 Ambulatory High Risk Anesthesia Consultation. *4 credits.*

High-Risk Anesthesia Consultation is a four-week M4 ambulatory rotation with the high-risk anesthesia consult service at FMLH. The focus will be on performing a comprehensive and concise preoperative history and physical exam, evaluating the patient's current medical status, and assessing the clinical risk profile to help guide the perioperative plan (additional preoperative testing or consultations, intraoperative anesthetic plan, and postoperative pain management plan).

ANES D4905 Ambulatory Anesthesiology. *4 credits.*

The shift from hospital based to less expensive surgery center settings (for appropriate patients) continues to grow. This course will provide the opportunity for senior medical students to expand on and enhance their previous experience with perioperative anesthetic management of adult patients, with particular emphasis on considerations relevant to the ambulatory setting. During the 4-week rotation, the students will be assigned to work directly with anesthesia providers on cases that will provide the greatest learning opportunity. Students will learn about what is unique with regard to patient management in a free-standing surgery center setting (as it relates to other types of surgical management). They will participate in preoperative screening and evaluation, inoperative (hands on) delivery of anesthesia and postoperative management in preparation for discharge to home.

ANES D4908 Ambulatory Pain Management. *4 credits.*

Students will acquire knowledge that will be useful and applicable to any chosen medical specialty. Students will learn the assessment and management of patients in a variety of pain states, including chronic pain in a multidisciplinary setting, as well as acute and cancer pain whenever the opportunity arises. The students learn through active participation in patient care. Student will also learn about many different types of pain syndromes and the use and risks of opioid medication. The pharmacology of pain treatment and pain medications will be an integral part of the experience. Text material will be available. Students will learn about the current opioid epidemic and treating pain within this era. They will also learn about opioid weaning and having difficult discussions with patients.

FMED D4903 Family Medicine Ambulatory Rotation. *4 credits.*

This course will provide an excellent opportunity for senior medical students to enhance their ambulatory care and family medicine skills via a broad range of direct outpatient care experiences that stresses continuity of care --The senior medical student will work in our outpatient Family Health Center on a full-time basis and will serve as primary physician for the patients that he/she sees. --The student will see and manage common undifferentiated outpatient problems and learn ambulatory medicine skills, including counseling, nutrition, preventive care, prenatal care, patient education techniques, involving the spectrum from pediatric to geriatric medicine. --The student will develop a problem list and record appropriately in the electronic health record the management plan with the supervision of the attending physicians and residents.

FMED D4904 Ambulatory Family Medicine Elective at the Southside Family Medicine Residency. *4 credits.*

This ambulatory family medicine course will take place with faculty at the new Froedtert Southside Family Medicine Residency, which is opening its doors in June 2023 and accepting its first class of residents in July 2023. Senior medical students that rotate in this clinic will have the opportunity to care for an urban underserved predominately Latin-x patient population. The Southside FMR will provide comprehensive ambulatory care for adults and children, prenatal care, and care for patients with substance use disorders. Students rotating in this environment will have the opportunity to assess patients with significant social, psychiatric, and economic barriers to care and will learn how to overcome these barriers to provide excellent healthcare for all. Students that rotate in this clinical environment will have the opportunity to experience clinical instruction from expert family medicine residency faculty and fully participate in the clinical care at this site. This rotation would also serve as an excellent opportunity for future family medicine residency applicants to practice in this clinical site and determine if it would be a good fit for their residency training.

MEDI D4901 Ambulatory Internal Medicine. *4 credits.*

The Ambulatory Medicine Clerkship allows students to continue to develop clinical skills and gain confidence in the diagnosis and management of medical problems commonly encountered in an adult ambulatory population. This is a required course in the M4 Curriculum at MCW; the objectives are based on the MCW M4 Discovery Curriculum. Students are recommended to utilize this month as an opportunity to prepare for internship and residency, especially in the following areas: --become more independent using clinical reasoning skills in diagnostic and therapeutic plan development. --improve efficiency without detracting from detail-oriented and compassionate patient care. --continue to refine medical communications skills including patient counseling, oral case presentations, and written documentation in the medical record.

MEDI D4906 Ambulatory Rheumatology. *4 credits.*

Ambulatory Rheumatology course designed for fourth year medical students to participate in the field of Rheumatology. Students will participate in a combination of outpatient clinics along with inpatient consult service and didactics.

MEDI D4911 Ambulatory Endocrinology. *4 credits.*

In this course students will be involved with --Evaluation and management of common endocrine disorders including diabetes mellitus, thyroid, calcium, and pituitary disease. --Review of endocrine physiology and pathophysiology. Mutually Exclusive Course. See Mutually Exclusive Course List: <https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

OBGY D4902 Ambulatory Reproductive Endocrinology and Infertility. *4 credits.*

This course will provide an overview of gynecologic reproductive endocrinology and Infertility with an emphasis on the evaluation and management of infertility in men and women. Heavy emphasis on hands on skills with the performance of trans vaginal and trans abdominal ultrasounds, hysterosalpingograms, and a significant role during surgical procedures. Students will improve their skills in conducting focused histories pertaining to fertility in men and women and the performance of speculum exams. Mutually Exclusive Course. See Mutually Exclusive Course List: <https://infoscope.mcw.edu/M4MutallyExclusiveCourses.pdf>

OSUR D4912 Ambulatory Orthopaedics

In this course students will --Independently recognize musculoskeletal system symptoms and assess clinical acuity of patients --Acquire skills of basic orthopedic clinical examination. -- Understand non-operative and operative treatment options available for common musculoskeletal disorders. --Conduct a basic review of radiographs used in orthopedic evaluation.

OSUR D4913 Ambulatory Multidisciplinary Sarcoma Group. *4 credits.*

In this course student will --Develop a reasoned approach for the proper assessment and management of patients with Sarcoma using a multidisciplinary approach. --Interpret various diagnostic tests used to evaluate patients with Sarcoma including, Plain X-Ray, MRI, CT, PET CT, Bone Scan, Angiography. --Identify the essential components in establishing a plan of care for patient with Sarcoma once tissue diagnosis is made including the need for adjuvant therapy such as chemotherapy or radiation therapy. --Use physical exam, diagnostic studies, and specific patient characteristics to create surgical plan including skeletal reconstruction and soft tissue reconstruction. --Learn to discuss limb salvage surgery versus amputation in a professional but empathetic manner. --Understand the essential roles of the members of the multidisciplinary Sarcoma Group including Surgeons, Oncologists, Radiologists, Anesthesiologists --Develop the ability to communicate in a professional manner with representatives of several disciplines.

PEDS D4907 Ambulatory Allergy and Immunology. *4 credits.*

In this course the student will have the opportunity to evaluate children and adults with asthma, allergic rhinitis, food allergies, drug allergies, urticaria, immunodeficiency, and various other allergic and immunologic conditions. Our goal is that you experience and understand the outpatient evaluation and treatment of these conditions.

PEDS D4914 Ambulatory Pediatric Gastroenterology. *4 credits.*

This course will expose students in primarily clinic and occasionally hospital settings to common pediatric gastrointestinal disorders. The student will participate in the out-patient clinics, scheduled divisional education sessions, and a small amount of in-patient wards as well as endoscopy suite. Students will see patients directly and given feedback on presentation skills, documentation, and establishment of a management plan.

PEDS D4915 Ambulatory Pediatric Rheumatology. *4 credits.*

In this course student will see patients referred to the ambulatory pediatric rheumatology clinic with musculoskeletal and systemic complaints as well as patients with known chronic rheumatic diseases followed by the rheumatology service. As time permits, occasional hospitalized patients with either known rheumatic disease or for whom rheumatology consult has been requested will also be evaluated under the supervision of pediatric rheumatology fellows and faculty. The student will usually evaluate patients initially and then discuss with faculty prior to the faculty and student returning to evaluate patients together. Ambulatory clinics will occur daily and are supplemented by weekly 60-90 minute discussions of the major rheumatic diseases of childhood and other relevant topics. In addition, a weekly clinical staff conference and journal club/lecture provide additional educational opportunities. These experiences will allow the student to learn to perform an accurate and reliable musculoskeletal and joint examination, to recognize common patterns of pediatric musculoskeletal and rheumatic disease, to understand the utility of laboratory and imaging studies, and to develop a greater understanding of the rheumatic diseases of childhood, including juvenile idiopathic arthritis, systemic lupus erythematosus, juvenile dermatomyositis, scleroderma, and vasculitis.

PMRE D4917 Ambulatory Spasticity Management and Rehabilitation. *4 credits.*

In this course students will --Identify specific neurologic disorders/ syndromes resulting in functional deficits and correlate the anatomic and physiologic basis for spasticity in those conditions. --Review the common patterns of clinical motor dysfunction and resulting functional deficits. --Describe and compare the treatment options available for the management of spasticity, including physical and occupational therapy, medication management, neurotoxin injections, intrathecal baclofen pumps, and surgical treatments. --Formulate a comprehensive rehabilitative plan of care for patients with spasticity.

PMRE D4918 Ambulatory Pediatric Rehabilitation. *4 credits.*

In this course students will --Be exposed to an interdisciplinary team approach for providing pediatric rehabilitative care. --Work with the entire rehab team as well as other specialties to provide a plan for making children with impairments secondary to conditions such as cerebral palsy, spina bifida and muscular dystrophy as well as injuries such as traumatic brain injuries and spinal cord injuries, as functional as possible. --Obtain, organize, and present a rehabilitative medicine history and perform a comprehensive physical examination, recognizing the impact of injury and disabling pediatric diseases on the developing child. --Gain exposure to the treatment of spasticity including chemodenervation procedures. --Gain exposure to prescription and use of adaptive equipment including orthotics, prosthetics, wheelchairs, standers and communication devices.

RONC D4909 Ambulatory Community Oncology. *4 credits.*

Course Overview: In this rotation, students will spend time rotating in an outpatient community cancer center. They will spend time in the medical oncology, radiation oncology, and surgical oncology clinics. They will rotate through radiology, including breast radiology and spend time in pathology. They will engage in the multi-disciplinary care of cancer patients and will follow patients to the OR when applicable.

Clerkships

ANES D3300 Anesthesiology. *2 credits.*

In this course students will learn about the care of perioperative patients throughout all phases of perioperative care. The focus will be on performing a preoperative evaluation and identifying risk factors, intraoperative management (including management of common problems) and post-operative care (including acute pain management). Procedural skills taught will include venipuncture, peripheral IV placement, and basic airway management (mask ventilation and intubation). Students will be introduced to invasive monitoring (arterial lines/central venous lines) and regional anesthesia procedures (spinal/epidural/nerve blocks). The Anesthesiology clerkship is graded on a pass/fail basis.

FMED D3300 Family Medicine. *4 credits.*

In this course students will learn to: -- Demonstrate the unequivocal value of primary care as an integral part of any health care system. -- Teach an approach to the evaluation and initial management of acute presentations commonly seen in the office setting. -- Teach an approach to the management of chronic illnesses that are commonly seen in the office setting. -- Teach an approach to conducting a wellness visit for a patient of any age or gender. Model the principles of family medicine care. -- Provide instruction in communication, physical examination, assessment and clinical reasoning skills.

MEDI D3300 Internal Medicine. *8 credits.*

In this course students will learn about the practice of internal medicine in the inpatient setting. National curricular objectives for the Internal Medicine Clerkship were developed by the Clerkship Directors in Internal Medicine working (CDIM) group. This core clerkship model focuses on the basic competencies of general internal medicine pertinent to the care of patients in hospital and ambulatory settings. Following a national survey of internal medicine faculty, the CDIM developed and validated a prioritized list of competencies considered necessary for third-year medical students. These generalist clinical competencies and the MCW Competencies are the basis for the core Internal Medicine Clerkship.

OBGY D3300 Obstetrics and Gynecology. *6 credits.*

During the Obstetrics and Gynecology (Ob-Gyn) third-year clerkship, students will learn and participate in both outpatient and inpatient encounters of both pregnant and non-pregnant patients using a wide variety of learning experiences. This includes the opportunity to scrub in on many gynecologic surgeries, both inpatient and outpatient as well as assist in both vaginal deliveries and cesarean deliveries. This clerkship incorporates weekly teaching conferences as well as two, full-day didactic lecture series held on designated Wednesdays. Additionally on Wednesdays, you will attend your site-specific Ob-Gyn Department Teaching Conference. Our teaching is done by a combination of resident physicians, full-time faculty members, volunteer faculty members, and members of the nursing staff, as such, student evaluations will be completed and discussed during the entirety of the clerkship.

PEDS D3300 Pediatrics. *6 credits.*

In this course students will learn about the: -- Acquisition of basic knowledge of growth and development (physical, physiologic and psychosocial) and of its clinical application from birth through adolescence. -- Acquisition of the knowledge necessary for the diagnosis and initial management of common pediatric acute and chronic illnesses. -- Approach of pediatricians to the health care of children and adolescents. -- Influence of family, community and society on the child in health and disease. -- Development of communication skills that will facilitate the clinical interaction with children, adolescents and their families and thus ensure that complete, accurate data are obtained. -- Development of competency in the physical examination of infants, children and adolescents. -- Development of clinical problem-solving skills. -- Development of strategies for health promotion as well as disease and injury prevention. -- Development of the attitudes and professional behaviors appropriate for clinical practice.

PSYC D3300 Psychiatry. *4 credits.*

In this course students will learn about the six basic areas applicable and important to the functioning of a physician practicing medicine: -- An appreciation that all patients have emotional needs and concerns. -- An ability to accept patients as needing assistance from a bio-psychosocial perspective. -- The ability to perform an evaluation interview leading to a presumptive diagnosis of an emotional problem and/or mental illness. -- The ability to form an educated opinion (and in the process eradicate stigma) of what the prognosis may be (instilling a sense of hopefulness if possible) based on the diagnosis of emotional disorder or mental illness and consideration of personality factors. -- The role and use of psychiatric treatment modalities. -- The evaluation and treatment of psychiatric emergencies including understanding the criteria and legal ramifications for involuntary treatment.

SURG D3300 Surgery. *8 credits.*

In this course, students will learn about a wide variety of topics in both general surgery and the surgical subspecialties. Students may be assigned to a variety of rotations, including General Surgery, Acute Care Surgery, Trauma Surgery, Transplant Surgery, Cardiothoracic Surgery, Pediatric Surgery, Vascular Surgery, or community-based general surgical practice. Students completing the clerkship will be able to recognize common surgical diseases and be familiar with the initial evaluation and management of these common surgical problems.

Continuous Professional Development

INTE D3300 Continuous Professional Development Milwaukee. *0.5 credit per term.*

In this course students will learn about the continuation of the early clinical coursework in the M1 and M2 years to ensure students' continued competency progression through the M3-M4 years.

INTE D4300 Continuous Professional Development Milwaukee. *0.5 credit.*

This course is the continuation of the early clinical coursework in the M1 and M2 years to ensure students' continued competency progression through the M3-M4 years.

INTE D4320 Continuous Professional Development with Capstone: Milwaukee. *1 credit.* This course is the continuation of the early clinical coursework in the M1 and M2 years to ensure students' continued competency progression through the M3-M4 years. This course includes the Capstone component of CPD for those students intending to graduate at the end of the term.

Pathways

Scholarly Pathways are a required component of the M1 and M2 year of the Discovery Curriculum. Students select one of the eight pathways as an area of concentration through which they enrich and individualize their medical training, while exploring an area of interest. Students can apply to participate in a pathway during their M3 year. Each Pathway course features a structured curriculum with monthly learning sessions (core), and an experiential component (noncore) that follows an Individual Learning Plan (ILP) guided by a faculty advisor.

PWAY D1201 Clinician Educator Pathway. *1.5 credits per term.*

Topics covered in the Clinician Educator Pathway fall within these primary domains: Teaching and Learning Curriculum Development Learner Assessment Program Evaluation Educational Leadership and Administration Advising and Mentoring Creating Educational Scholarly Products Topics are presented in both the first- and second-year curriculum. The first-year sessions are focused on application of the concepts to a group project with guidance for application to an educational scholarly project. The second-year curriculum allows students to practice the concepts in more depth. Each core session day includes a discussion of teaching and learning concepts, led by the M3 Clinician Educator Pathway students and demonstrating how these issues impact the student experience.

PWAY D1202 Global Health Pathway. *1.5 credits per term.*

Students participating in the Global Health Pathway will have the opportunity to learn and discuss important principles and practices of global health sciences, providing the students with unique multidisciplinary insights and new perspectives to understand how they can affect health—from neighborhoods to nations. The curriculum highlights the special expertise and experiences of MCW faculty and staff in the broad field of global health. Pathway activities are coordinated with the Office of Global Health. Opportunities for local and international clinical, educational, community-engagement or research experiences are available. Core components include: • Overview of research methods and IRBs requirements • Disaster management, injury prevention and control • Clinical tropical medicine, infectious diseases and parasitology • Health care delivery systems and principles of partnership • Medical anthropology, ethics and cultural sensitivity • Non communicable and chronic diseases • Global disease epidemiology • Maternal and child health • Refugee and immigrant health • Cross-cultural communication – working with Limited English Proficient patients • Working with multi-disciplined teams"

PWAY D1204 Clinical and Translational Research Pathway. *1.5 credits per term.*

The Clinical and Translational Research Pathway is for students interested in complementing their clinical development with the skills required to become clinician-scientists. Through core sessions and a mentored research project, students gain an understanding of the way research improves patient care. Encompassing clinical and translational research, this Pathway uses a hypothesis driven research project to provide the student an individualized research experience allowing for the development of broad research skills.

PWAY D1205 **Basic to Translational Research** Pathway. *1.5 credits per term.*

Individualized learning activities in the Molecular and Cellular Research (MCR) Pathway will be steeped in research competencies and focused on a mentored project. Students will independently find a project mentor with whom to work on a hypothesis-driven research project to provide the student the opportunity to develop broad research skills at the molecular and cellular level.

PWAY D1207 Introduction to Pathways. *0 credits.*

Scholarly Pathways are a required component of the M1 and M2 year of the Discovery Curriculum. Students select one of the eight pathways as an area of concentration through which they enrich and individualize their medical training, while exploring an area of interest. Students can apply to participate in a pathway during their M3 year. The Introduction to Pathways (ITP) course is designed to introduce students to the key competencies and requirements for each Pathway through D2L asynchronous videos and digital documents, and at learning fairs with course directors and older students enrolled in the course. The course begins the week after Orientation for first-year students, and continues for approximately 5 to 7 weeks, depending on the academic calendar.

PWAY D1208 Urban and Community Health Pathway. *1.5 credits per term.*

Urban and Community Health Pathway links education with community needs and assets to shape knowledge, skills and attitudes needed by effective medical providers in urban, under-served communities, addressing: A. The balance between biologic and non- biologic determinants of health and disease B. Health conditions that disproportionately affect urban, under-served populations C. Disparities in health, healthcare access and quality in urban settings D. Educational strategies to promote healthy behaviors in individuals and communities. E. Partnership with public health/ community agencies to meet health/ healthcare needs F. Civic-engagement and leadership skills, including ability to advocate for patients, communities and/or systems changes to improve health.

PWAY D1209 Quality Improvement & Patient Safety Pathway. *1.5 credits per term.*

The QulPS Pathway provides students with the core principles and skills that will complement any field of medicine. Students will learn the core principles and skills necessary to understand and analyze the systems-based aspects of patient care, actively engage in work to improve the quality of patient care and enhance patient safety while focusing on the goal of achieving the best possible health outcomes for patients and for populations.

PWAY D1210 Bioethics and Medical Humanities Pathway. *1.5 credits per term.*

In this Pathway, students will read bioethics scholarly literature, discuss the literature, and apply clinical ethics. Research ethics will also be explored via readings, discussions, and hands-on activities. The main learning activities utilized in the Bioethics Pathway core sessions are large-group (12-18 students) and small group (3-11 students) discussion, case-based discussions, and patient presentations by M3s.

PWAY D1211 Health Systems Management Pathway. *1.5 credits per term.*

The purpose of the Health Systems Management and Policy (HSMP) Pathway is to help students understand health policy and the business and economics of medicine, and to provide students with leadership skills so that they can participate in the changes necessary for the U.S. health care system to improve and thrive. While medicine remains a calling, it is also a business. Knowing how health care is financed and delivered and the policies that govern how health systems provide care to patients and populations is essential to understand how the health system works. Recent and ongoing changes in the delivery of health care in the United States have made health care delivery even more complex. It is not sufficient for physicians to simply understand what procedures to do to whom and what medications to prescribe. Physicians also have to understand population health, variation in care, insurance restrictions and pre-authorization, and how to manage health care teams.

Central Wisconsin Discovery Curriculum

M1 Year

MCW-Central Wisconsin Curriculum Schedule and Course Descriptions

MCW-Curriculum

Year One - Summer		Year One - Fall				Year One - Spring																																													
July	August	September	October	November	December	January	February	March	April	May	June																																								
Foundations of Clinical Medicine	Clinical Human Anatomy (CHA)				Winter Break	CHA	Infectious Agents		and Host Immunity			CWIC 1A (5 wks)																																							
	Molecules to Cells					FHB*	Principles of		Drug Action																																										
	Physiology					Medical Neuroscience	Clinical Apprenticeship		Medical Neuroscience																																										
	Clinical Apprenticeship					Bench to Bedside	CPD		Clinical Apprenticeship																																										
Continuous Professional Development (CPD)		Physician in the Community (Pathways)				Physician in the Community		Physician in the Community																																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52

* Foundations of Human Behavior

COURSE KEY

Basic Science Courses
Clinical Courses
Early Clinical Courses
Scholarly Pathways



M2 Year

MCW-Central Wisconsin Curriculum Schedule and Course Descriptions

MCW-Curriculum

Year Two - Summer		Year Two - Fall				Year Two - Spring																																													
July	August	September	October	November	December	January	February	March	April	May	June																																								
CWIC 1B (5 wks)	Musculoskeletal + Skin	Cardiovascular	Renal	Respiratory	Heme-Lymph	Winter Break	GI Nutrition	Endo/Repro	Neuro	Spring Break	USMLE Step 1	CWIC 2 (5 wks)																																							
		Bench to Bedside					Foundational Capstone	CPD																																											
	Specialty Longitudinal Integrated Clinical Experience (SPLICE)				SPLICE**		Physician in the Community																																												
	Continuous Professional Development (CPD)				Physician in the Community (Pathways)			Physician in the Community																																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52

**SPLICE is one half-day/week for 4-12 weeks/semester

COURSE KEY

Basic Science Courses
Clinical Courses
Early Clinical Courses
Scholarly Pathways



M3 Year

MCW-Central Wisconsin Curriculum Schedule and Course Descriptions

MCW-Curriculum

Year Three - Summer		Year Three - Fall				Year Three - Spring																																													
July	August	September	October	November	December	January	February	March	April	May	June																																								
CWIC 3 (5 wks)	Elective*	CWIC 4 (5 wks)	CWIC 5 (5 wks)	IPD**	CWIC 6 (8 wks)	Acting Internship ***	Acting Internship ***	Symptoms	Capstone	Continuous Professional Development	Physician in the Community (Pathways)																																								
				Interviews																																															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52

*There is a 6 week Elective timeframe. Students must complete 4 weeks of Elective. The remaining 2 weeks can be used for an Elective or STEP study.

**Individual Professional Development (IPD) is 4 weeks of time to interview.

***Each student must complete two acting internships during the months of March and April (1/month). At least one of which must be a "Core Acting Internship."

Total instruction includes minimum 4 weeks Elective and 4 weeks Individual Professional Development

COURSE KEY

Basic Science Courses
Clinical Courses
Early Clinical Courses
Scholarly Pathways



Acting Internships Core

MEDI D3560 Medicine Core Acting Internship CW. *4 credits.*

This acting internship gives the student an increased level of responsibility for patient care building on prior clerkship experience. The acting intern will assume substantial responsibility for patient admissions, formulation of diagnostic and management plans, daily rounds, interprofessional and interdisciplinary care coordination and consultation, patient care documentation, and discharges under the supervision of a senior resident or attending physician. NOTE: Previously MEDI D3660 (201910).

Non-Core

EMED D3660 Emergency Medicine Acting Internship CW. *4 credits.*

This acting internship gives the student an increased level of responsibility, serving as the “physician of first contact”, for patient care building on prior clerkship experience. The acting intern will perform initial evaluation of patients presenting to the emergency medicine department with appropriate supervision by attending and/or resident physicians. Students will be expected to obtain a medical history, perform an appropriate exam and pend initial orders for further evaluation, including lab testing and imaging. Students will work with supervising preceptors to stabilize patients, and after consulting with their supervising preceptor, students will be encouraged to present assessment and management plans to patients. Students will be expected to call admitting and/or consulting physicians. Students will also be encouraged to participate in procedural and technical aspects of patient care in the ER and will be encouraged to participate in subsequent procedural or operative care when feasible.

Clerkships/Clinical Experiences Required

INTE D2225 Specialty Longitudinal Integrated Clinical Experience. *3 credits.*

Specialty Longitudinal Integrated Clinical Experience (SPLICE) is a required, planned learning activity during the M2 year on the CW campus. SPLICE consists of weekly half-day clinical experiences in a variety of medical settings, including outpatient, inpatient, consultative, OR, ED, and other settings, depending on the elective chosen. Since the Central Wisconsin 3-year, Longitudinal Integrated Clerkship (LIC) based curriculum allows for significant continuity experience through the year-long Clinical Apprenticeship (M1) and particularly the Longitudinal Integrated Clerkship (LIC), the SPLICE will provide students with opportunity for student selected, elective, specialty experiences within specialty- focused "clusters" (surgical, medical, collaborative care, mental health, women's health, diagnostic medicine, emergency, pediatric and primary care). Students will select one cluster for each semester of the M2 year. Experiences within that cluster will be from 1-3 months in length, with all experiences being at least one month (4 half-day sessions) in duration. This will give a combination variety of student selected elective experiences while still offering longitudinal focus within a specialty cluster. The MCW-CW SPLICE curriculum provides an opportunity for both clinical enrichment and early career exploration in the accelerated curriculum.

During each semester of SPLICE, students will be asked to reflect, and write a summary of their reflection, on the specialty or specialties they experienced. Students will be prompted to include the impact of their clinical experiences on knowledge, attitudes, skills and perspectives in relationship to their individual learning plan and career planning. These reflections will be collected by the course director and are required for successful completion of the course. The reflections will not otherwise be graded. Students will not be given specific feedback on their reflections; however, they will be encouraged to share their thoughts with their faculty navigator and other mentors.

INTE D2226 Specialty Longitudinal Integrated Clinical Experience. 3 credits.

Specialty Longitudinal Integrated Clinical Experience (SPLICE) is a required, planned learning activity during the M2 year on the CW campus. The SPLICE consists of weekly half-day clinical experiences in a variety of medical settings, including outpatient, inpatient, consultative, OR, ED, and other settings, depending on the elective chosen. Since the CW 3-year, LIC based curriculum allows for significant continuity experience through the year-long Clinical Apprenticeship (M1) and particularly the Longitudinal Clerkship (LIC), the SPLICE will provide students with opportunity for student selected, elective, specialty experiences within specialty- focused "clusters" (surgical, medical, collaborative care, mental health, women's health, diagnostic medicine, emergency, pediatric and primary care). Students will select one cluster for each semester of the M2 year. Experiences within that cluster will be from 1-3 months in length, with all experiences being at least one month (4 half-day sessions) in duration. This will give a combination variety of student selected elective experiences while still offering longitudinal focus within a specialty cluster. The MCW-CW SPLICE curriculum provides an opportunity for both clinical enrichment and early career exploration in the accelerated curriculum. During each semester of SPLICE, students will be asked to reflect, and write a summary of their reflection, on the specialty or specialties they experienced. Students will be prompted to include the impact of their clinical experiences on knowledge, attitudes, skills and perspectives in relationship to their individual learning plan and career planning. These reflections will be collected by the course director and are required for successful completion of the course. The reflections will not otherwise be graded. Students will not be given specific feedback on their reflections; however, they will be encouraged to share their thoughts with their faculty navigator and other mentors.

INTE D3010 Longitudinal Integrated Clerkship 1 CW. 6 credits.

Longitudinal Integrated Clerkship 1 represents the initial clerkship experience on the MCW-CW campus. Students participate in this experience following completion of M1 requirements. The Longitudinal Integrated Clerkship will allow students to experience Surgery, Anesthesiology, Obstetrics & Gynecology, Family Medicine, Pediatrics, Psychiatry, and Medicine core clinical experiences in a longitudinally integrated fashion. The particular composition of each student's learning experiences will vary based on local resources; however, all students will be monitored to ensure completion of course & institutional requirements. On average, students spend time in Family Medicine, Internal Medicine, Pediatrics, and Psychiatry in 1-week increments. Students spend time in Surgery, OB/GYN, and Anesthesiology in 2-week increments.

Non-clinical instruction occurs in a series of 1-week blocks that are distributed throughout the entire longitudinal integrated clerkship experience. Additionally, students will spend approximately one night in 5 on call or in the ER/urgent care as best fits their learning needs and local resources. At the conclusion of INTE D3010, all students will receive a progress grade of satisfactory or unsatisfactory.

INTE D3020 Longitudinal Integrated Clerkship 2 CW. *8 credits.*

Longitudinal Integrated Clerkship 2 represents the continuing clerkship experience on the MCW-CW campus. It is a continuation of INTE D3010. The Longitudinal Integrated Clerkship will allow students to experience Surgery, Anesthesiology, Obstetrics & Gynecology, Family Medicine, Pediatrics, Psychiatry, and Medicine core clinical experiences in a longitudinally integrated fashion. The particular composition of each student's learning experiences will vary based on local resources; however, all students will be monitored to ensure completion of course and institutional requirements. On average, students spend time in Family Medicine, Internal Medicine, Pediatrics, and Psychiatry in 1-week increments. Students spend time in Surgery, OB/GYN, and Anesthesiology in 2-week increments. Non-clinical instruction occurs in a series of 1-week blocks that are distributed throughout the entire longitudinal integrated clerkship experience. Additionally, students will spend approximately one night in 5 on call or in the ER/urgent care as best fits their learning needs and local resources. At the conclusion of INTE D3020, all students will receive a progress grade of satisfactory or unsatisfactory.

INTE D3030 Longitudinal Integrated Clerkship 3 CW. *7 credits.*

Longitudinal Integrated Clerkship 3 represents the continuing clerkship experience on the MCW-CW campus. It is a continuation of INTE D3020. Students participate in this experience after successful completion of the M2 requirements and INTE D3020. The Longitudinal Integrated Clerkship will allow students to experience Surgery, Anesthesiology, Obstetrics & Gynecology, Family Medicine, Pediatrics, Psychiatry, and Medicine core clinical experiences in a longitudinally integrated fashion. The particular composition of each student's learning experiences will vary based on local resources; however, all students will be monitored to ensure completion of course and institutional requirements. On average, students spend time in Family Medicine, Internal Medicine, Pediatrics, and Psychiatry in 1-week increments. Students spend time in Surgery, OB/GYN, and Anesthesiology in 2-week increments. Non-clinical instruction occurs in a series of 1-week blocks that are distributed throughout the entire longitudinal integrated clerkship experience. Additionally, students will spend approximately one night in 5 on call or in the ER/urgent care as best fits their learning needs and local resources. At the conclusion of INTE D3030, all students will receive a progress grade of satisfactory or unsatisfactory.

INTE D3040 Longitudinal Integrated Clerkship 4 CW. *13 credits.*

Longitudinal Integrated Clerkship 4 represents the continuing clerkship experience on the MCW-CW campus. It is a continuation of INTE D3030. Students will participate in this experience following completion of INTE D3030. The Longitudinal Integrated Clerkship will allow students to experience Surgery, Anesthesiology, Obstetrics & Gynecology, Family Medicine, Pediatrics, Psychiatry, and Medicine core clinical experiences in a longitudinally integrated fashion. The particular composition of each student's learning experiences will vary based on local resources; however, all students will be monitored to ensure completion of course and institutional requirements. On average, students spend time in Family Medicine, Internal Medicine, Pediatrics, and Psychiatry in 1-week increments. Students spend time in Surgery, OB/GYN, and Anesthesiology in 2-week increments. Non-clinical instruction occurs in a series of 1-week blocks that are distributed throughout the entire longitudinal integrated clerkship experience.

Additionally, students will spend approximately one night in 5 on call or in the ER/urgent care as best fits their learning needs and local resources. At the conclusion of INTE D3040, all students will receive a progress grade of satisfactory or unsatisfactory.

INTE D3050 Longitudinal Integrated Clerkship 5 CW. *8 credits.*

Longitudinal Integrated Clerkship 5 represents the final clerkship experience on the MCW-CW campus. It is a continuation of INTE D3040. Students will participate in this experience following completion of INTE D3040. The Longitudinal Integrated Clerkship will allow students to experience Surgery, Anesthesiology, Obstetrics & Gynecology, Family Medicine, Pediatrics, Psychiatry, and Medicine core clinical experiences in a longitudinally integrated fashion. The particular composition of each student's learning experiences will vary based on local resources; however, all students will be monitored to ensure completion of course and institutional requirements. On average, students spend time in Family Medicine, Internal Medicine, Pediatrics, and Psychiatry in 1-week increments. Students spend time in Surgery, OB/GYN, and Anesthesiology in 2-week increments. Non-clinical instruction occurs in a series of 1-week blocks that are distributed throughout the entire longitudinal integrated clerkship experience.

Additionally, students will spend approximately one night in 5 on call or in the ER/urgent care as best fits their learning needs and local resources. At the conclusion of INTE D3050, all students will receive a progress grade of satisfactory/unsatisfactory for INTE D3050 as well as final cumulative letter grades for the following clerkship experiences: Family Medicine, Pediatrics, Surgery, Internal Medicine, Psychiatry, and OB/GYN and a final satisfactory/unsatisfactory grade for Anesthesiology.

INTE D3111 Required Integrated Clerkship Experience CW. *2 credits.*

The Required Integrated Clerkship Experience (RICE) allows Central Wisconsin students to continue clinical work with their Longitudinal Integrated Clerkship (LIC) preceptors. This is a 2-week experience that occurs during the Fall of the M3 year. The intent of this course is to provide flexibility for students to balance residency interview needs and clinical education responsibilities. The particular composition of each student's learning experiences will vary based on local resources and student interest, however, will generally be a continuation of their LIC experience.

Continuous Professional Development

INTE D1100 Continuous Professional Development. *0.5 credit per term.*

In this course students will learn via a series of planned learning activities to ensure continued competency progression through the M1-M3 years. Each student will: -- Complete required components of clerkships and acting internships including OSCEs, patient encounter logs – Ongoing communications with CPD director (email) – Meet one-on-one with CPD director (scheduled or on demand) – Complete Student Self-assessment (24 hours ahead of meeting) – Participate in Interprofessional Team-based Exercises (scheduled) – Complete remediation plan (if required) During each semester, students will meet one-on-one with their assigned CPD director for advising and performance reviews and remediation where required. For students with performance concerns the CPD director will consult with Course or Clerkship Directors Committee and Student Affairs and make a recommendation to the Academic Standing Committee regarding remediation recommendations.

INTE D2200 Continuous Professional Development. *0.5 credit per term.*

In this course students will prepare for the practice of medicine in the community. Topics discussed will include examining the health care needs of specific populations including individuals from different ethnic, cultural and age-related populations as well as persons with physical and cognitive disabilities. These topics will be addressed using lecture, small groups, case-based studies and exposure to individuals providing community resources. The student will also be acquainted with community services including the emergency medical response system. Clinical reasoning skills including appropriate use of laboratory, x-ray and diagnostic services will also be addressed in reference to the Triple Aim. Students will prepare and deliver a presentation on a topic related to the appropriate use of diagnostic services.

INTE D3340 Continuous Professional Development Central Wisconsin. *0.5 credit.*

In this course students will learn about the continuation of the early clinical coursework in the M1 and M2 years to ensure students' continued competency progression through the M3-M4 years.

INTE D3350 Continuous Professional Development with Capstone: Central Wisconsin. *1 credit.*

In this course students will learn about the continuation of the early clinical coursework in the M1 and M2 years to ensure students' continued competency progression through the M3-M4 years. This course includes the Capstone component of CPD for those students intending to graduate at the end of the term.

INTE D3360 Continuous Professional Development without Capstone: Central Wisconsin. *0.5 credit.*

In this course students will learn about the continuation of the early clinical coursework in the M1 and M2 years to ensure students' continued competency progression through the M3-M4 years.

INTE D4340 Continuous Professional Development Central Wisconsin. *0.5 credit.*

In this course students will learn about the continuation of the early clinical coursework in the M1 and M2 years to ensure students' continued competency progression through the M3-M4 years.

INTE D4350 Continuous Professional Development with Capstone: Central Wisconsin. *1 credit.*

In this course students will learn about the continuation of the early clinical coursework in the M1 and M2 years to ensure students' continued competency progression through the M3-M4 years. This course includes the Capstone component of CPD for those students intending to graduate at the end of the term.

Pathway

PWAY D1213 Physicians in the Community Pathway CW. 1.5 credits per term.

The Pathway is a two-year longitudinally formatted course with occasional large group seminars and weekly reserved time for self-directed learning. The desired outcomes include increased knowledge and enrichment in content areas not fully explored in the standard curriculum. For example, students will learn essential qualities and behaviors of physicians which are not solely disease based. The student will engage in learning about not only disease treatment, but health and health interventions, the introduction of the role of the physician in the community, medical ethics, individual, community, population and global health, health disparities, community engagement, and other pertinent topics to physician practice. The Pathway provides support for and emphasis on student scholarship; the scholarly project follows established best practices for student research. Self-directed learning components are based on an Individual Learning Plan, devised between a student and his/her advisor as the student prepares to complete their Community Oriented Primary Care (COPC) project. The COPC project is to be completed by the end of the M2 year and will be presented in a formal presentation.

Green Bay Discovery Curriculum

M1 Year

MCW-Green Bay Curriculum Schedule and Course Descriptions

Discovery Curriculum MCW-GB 3 Year

Year One Summer		Year One Fall						Year One Spring																																												
July		August	September	October	November	December	January	February	March	April	May	June																																								
Foundations of Clinical Medicine	Clinical Human Anatomy		CHA				Infectious Agents and Host Immunity		Family Medicine ¹																																											
	Molecules to Cells		FHB				Principles of Drug Action		4 weeks																																											
	Physiology		Medical Neuroscience				Clinical Apprenticeship																																													
	Clinical Apprenticeship		Bench to Bedside				CPD																																													
Continuous Professional Development (CPD)																																																				
Scholarly Pathways																																																				
Week #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52

¹ Summer clerkship rotation options: Family Medicine & OB-GYN, Family Medicine & Pediatrics, Surgery & 2-week elective

Course Key

- Basic Science Courses
- Clinical Courses
- Early Clinical Course
- Scholarly Pathways

M2 Year

MCW-Green Bay Curriculum Schedule and Course Descriptions

Discovery Curriculum MCW-GB 3 Year

Year Two Summer		Year Two Fall						Year Two Spring																																													
July		August		September		October		November		December		January		February		March		April		May		June																															
OBGYN 6 weeks	Clinical Elective	Foundations of Pathological Processes-MSS*		Cardio-vascular		Renal-Respiratory		Heme-Lymph		Winter Break		GI-Nutrition		Endo-Repro		Neuro-Psych		Symptoms		USMLE 1 Study/Exam		Psychiatry 4 weeks																															
												Bench to Bedside		Foundational Capstone																																							
		Longitudinal Clinical Elective		Longitudinal Clinical Elective ²		CPD																																															
		Continuous Professional Development		Scholarly Pathways																																																	
Scholarly Pathways		Scholarly Pathways																																																			
Week #		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52

¹Summer clerkship rotation options: Family Medicine & OB-GYN, Family Medicine & Pediatrics, Surgery & 2-week elective
²Longitudinal Clinical Elective is one half-day per week for 40 weeks - completion of OBGYN, Pediatrics or Surgery rotation
 *Musculoskeletal Skin

Course Key

	Basic Science Courses
	Clinical Courses
	Early Clinical Course
	Scholarly Pathways

M3 Year

MCW-Green Bay Curriculum Schedule and Course Descriptions

Discovery Curriculum MCW-GB 3 Year

Year Three Fall												Year Three Spring																																									
July		August		September		October		November		December		January		February		March		April		May		June																															
Internal Medicine 8 weeks		Surgery 8 weeks		Elective 4 weeks		Independent Professional Development USMLE STEP 2		Winter Break		Pediatrics 6 weeks		Anesthesia 2 weeks		Core Acting Internship* 4 weeks		Acting Internship* 4 weeks		Ambulatory Capstone		Continuous Professional Development																																	
																						Continuous Professional Development																															
Continuous Professional Development		Continuous Professional Development																																																			
Week #		1	2	3	4	5	6			7	8	9	10	11	12	13	14	15	16			17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

Students will rotate through third year based on individual track assignment
 *Each student must complete two acting internships, at least one of which must be a "Core Acting Internship." The Core Acting Internship may be completed in March or April

Course Key

	Basic Science Courses
	Clinical Courses
	Early Clinical Course
	Scholarly Pathways

Acting Internships Core

ANES D3502 Anesthesiology Core Acting Internship GB. *4 credits.*

The Anesthesiology Core Acting Internship's goal is to refresh and broaden the knowledge of Anesthesiology gained during the Junior year. Learn advanced hemodynamic monitoring and application of physiology and pharmacology with an emphasis on cardiovascular anesthesiology. This is done with hands on experience in the technical aspects of Anesthesiology, e.g., airway management, endotracheal intubation, placement of venous and arterial catheters and management of pulmonary artery catheters along with understanding the risks and benefits of various anesthetic techniques.

FMED D3560 Family Medicine Core Acting Internship GB. *4 credits.*

During this course, students will learn about the role of a family physician in a rural family practice setting in northern Wisconsin. Students will have an opportunity to build gain core knowledge regarding patient interviewing and technical skills needed by a generalist physician in evaluating, diagnosing, and managing adult hospitalized patients, newborns and obstetric patients. Students will be exposed to the broad scope of family medicine in the outpatient clinic and hospital setting.

MEDI D3570 Medicine Core Acting Internship GB. *4 credits.*

This acting internship gives the student an increased level of responsibility for patient care on the medical floors of regional hospitals. The acting intern will assume substantial responsibility including being the point of first contact for initial admission of patients, formulating the diagnostic and treatment plan, and following and documenting the patients' progress.

OBGY D3557 Obstetrics and Gynecology Core Acting Internship GB. *4 credits.*

The student will work closely with a small private group of OB-GYNs on Labor and Delivery, in the operating room and in their offices. They will assume substantial clinical responsibility in the assessment and management of labor and in the pre- and post-operative management of gynecologic surgery patients. They will participate in surgeries and deliveries and will assess and manage a variety of prenatal and gynecological problems.

PEDS D3562 Pediatrics Core Acting Internship GB. *4 credits.*

This acting internship combines experiences on the General Pediatrics floor and Pediatric Intensive Care Unit in Green Bay Hospitals. The acting intern will assume substantial responsibility for admission of pediatric patients, formulating treatment plans, and following and documenting patient progress.

SURG D3561 Surgery Core Acting Internship GB. *4 credits.*

This acting internship will provide an exposure for advanced medical students to the broad field of general surgery, serving adult and adolescent patients. During this rotation, students will be expected to serve as the “physician of first contact” for assigned patients including patients who require immediate intervention and those who require organization and prioritization of patient care responsibilities. Students are expected to formulate a prioritized problem list and generate a differential diagnosis. Students will develop and monitor patient management plans under direct supervision of faculty and maintain appropriate timely and accurate medical records. Students will communicate in an effective manner with all members of the healthcare team to coordinate patient care and counsel patients and their families, as appropriate on patients’ disorders. Students will perform procedures under direct supervision that are commensurate with the student’s skill level and complexity of the procedure. Students should experience a graduated level of responsibility over the course of their rotation, consistent with their level of performance and acquisition of clinical and procedural skills. Students will participate in call duties as appropriate and follow PGY-II duty hours rules. Students may be required to attend educational activities, including conferences, where they may be asked to present cases, and have the obligation to teach junior members of the team.

Non-Core

EMED D3658 Emergency Medicine Acting Internship GB. *4 credits.*

Students will assume substantial responsibility, acting as “physician of first contact” in the evaluation and stabilization of patients at one of the Emergency Departments of several Green Bay area hospitals. Students will also participate in didactic lectures and simulation sessions.

FMED D3659 Long-Term Care Acting Internship GB. *4 credits.*

This acting internship will involve the student in the care of complex patients in two long-term care facilities, assuming a higher level of responsibility and serving as “physician of first contact” for selected patients, under the supervision of an experienced attending family physician.

PSYC D3650 Psychiatry Acting Internship GB. *4 credits.*

This acting internship pairs a student with an attending and psychiatry residents in several inpatient settings in the Green Bay area which are training sites for the psychiatry residency. Settings include a psychiatric inpatient service in a private hospital, a public mental health facility and a facility partner of the Department of Corrections.

Clerkships

ANES D3350 Anesthesiology GB. 2 credits.

In a two-week block, students will be introduced to the care of perioperative patients throughout all phases of perioperative care. The focus will be on performing a preoperative evaluation and identifying risk factors, intraoperative management (including management of common problems) and post-operative care (including acute pain management). Procedural skills taught will include venipuncture, peripheral IV placement, and basic airway management (mask ventilation and intubation). Students will be introduced to invasive monitoring and regional anesthesia procedures (spinal/epidural/nerve blocks). The Anesthesiology clerkship is graded on a pass/fail basis.

FMED D2500 Family Medicine GB. 4 credits.

The Family Medicine Clerkship is a four-week required clerkship gives all students a chance to experience family medicine, primarily in an office setting. There, under the guidance of superb community family physicians, family medicine faculty physicians or family medicine residents, students see the broadest possible range of patients, learn and practice real-world management of common medical problems, and discover the satisfactions of family medicine. At the same time, students learn the core primary care skills that no other rotation can provide so comprehensively. Specific clerkship learning objectives for students are accomplished through a range of learning activities that include one-on-one time in an office setting with a family physician, classroom time, and community-based experiences. Much of the student's time will be spent in a clinical practice seeing patients, working with family physicians and learning from both.

MEDI D3350 Internal Medicine GB. 8 credits

In this course students will learn about the practice of internal medicine in the inpatient setting. National curricular objectives for the Internal Medicine Clerkship were developed by the Clerkship Directors in Internal Medicine working (CDIM) group. This core clerkship model focuses on the basic competencies of general internal medicine pertinent to the care of patients in hospital and ambulatory settings. Following a national survey of internal medicine faculty, the CDIM developed and validated a prioritized list of competencies considered necessary for third-year medical students. These generalist clinical competencies and the MCW Competencies are the basis for the core Internal Medicine Clerkship.

OBGY D2510, D2520, D2530, D3350 Obstetrics and Gynecology GB. 6 credits.

Our clerkship is designed to introduce medical students to the field of Obstetrics and Gynecology, providing them with the basic knowledge, skills and attitudes every physician should possess, regardless of future specialty choice. This clerkship is a six-week clerkship designed to provide medical students with a comprehensive background regarding women's health, allowing them to obtain the skills necessary to manage routine obstetric and gynecologic problems during their careers regardless of specialty choice. Students will work closely with a practice group of OB-GYNs.

They will follow a primary preceptor through outpatient clinics, surgeries, deliveries and hospital care. There will be opportunities to scrub in on gynecologic surgeries, both inpatient and outpatient. Students are also able to assist in vaginal and cesarean deliveries.

PEDS D2510, D2520, D2530, D3350 Pediatrics GB. *6 credits.*

The M2 Summer Block consists of: 1) two weeks of inpatient experience of St Vincent's Hospital with pediatric hospitalists/intensivists. Experience in the Newborn Nursery at St. Vincent's will be incorporated into the inpatient portion. 2) Two weeks of outpatient experience in a community pediatrician's office. One half-day per week will be freed for student study time; one half-day will be freed for Pathway activities. The outpatient experience will continue longitudinally through the M2 year, one half-day every other week. The longitudinal experience will also include one half-day per month of classroom and/or on-line didactic sessions. Clinical experience: 33% inpatient; 67% outpatient. Additional opportunities include Desire 2 Learn online modules.

PSYC D3350 Psychiatry GB. *4 credits.*

In this course students will learn about the six basic areas applicable and important to the functioning of a physician practicing medicine: 1) An appreciation that all patients have emotional needs and concerns. 2) An ability to accept patients as needing assistance from a bio-psycho-social perspective. 3) The ability to perform an evaluation interview leading to a presumptive diagnosis of an emotional problem and/or mental illness. 4) The ability to form an educated opinion of what the prognosis may be based on the diagnosis of emotional disorder or mental illness and consideration of personality factors. 5) The role and use of psychiatric treatment modalities. 6) The evaluation and treatment of psychiatric emergencies.

SURG D2510, D2520, D2530, D3350 GB. *8 credits.*

In this course, students will learn about a wide variety of topics in both general surgery and the surgical subspecialties. Students may be assigned to a variety of rotations, including General Surgery, Acute Care Surgery, Trauma Surgery, Transplant Surgery, Cardiothoracic Surgery, Pediatric Surgery, Vascular Surgery, or community-based general surgical practice. Students completing the clerkship will be able to recognize common surgical diseases and be familiar with the initial evaluation and management of these common surgical problems.

Continuous Professional Development

INTE D1100 Continuous Professional Development. *0.5 credit per term.*

In this course students will learn via a series of planned learning activities to ensure continued competency progression through the M1-M3 years. Each student will: -- Complete required components of clerkships and acting internships including OSCEs, patient encounter logs – Ongoing communications with CPD director (email) – Meet one-on-one with CPD director (scheduled or on demand) – Complete Student Self-assessment (24 hours ahead of meeting) – Participate in Interprofessional Team-based Exercises (scheduled) – Complete remediation plan (if required) During each semester, students will meet one-on-one with their assigned CPD director for advising and performance reviews and remediation where required. For students with performance concerns the CPD director will consult with Course or Clerkship Directors Committee and Student Affairs and make a recommendation to the Academic Standing Committee regarding remediation recommendations.

INTE D2200 Continuous Professional Development. *0.5 credit per term.*

In this course students will prepare for the practice of medicine in the community. Topics discussed will include examining the health care needs of specific populations including individuals from different ethnic, cultural and age-related populations as well as persons with physical and cognitive disabilities. These topics will be addressed using lecture, small groups, case-based studies and exposure to individuals providing community resources. The student will also be acquainted with community services including the emergency medical response system. Clinical reasoning skills including appropriate use of laboratory, x-ray and diagnostic services will also be addressed in reference to the Triple Aim. Students will prepare and deliver a presentation on a topic related to the appropriate use of diagnostic services.

INTE D3370 Continuous Professional Development Green Bay. *0.5 credit.*

In this course students will learn about the continuation of the early clinical coursework in the M1 and M2 years to ensure students' continued competency progression through the M3-M4 years.

INTE D3380 Continuous Professional Development with Capstone: Green Bay. *1 credit.*

In this course students will learn about the continuation of the early clinical coursework in the M1 and M2 years to ensure students' continued competency progression through the M3-M4 years. This course includes the Capstone component of CPD for those students intending to graduate at the end of the term.

INTE D3390 Continuous Professional Development without Capstone: Green Bay. *0.5 credit.*

The CPD3 without capstone course builds upon the competencies from the M1 and M2 years. This course is specifically for students opting to do third year at the Green Bay regional campus.

The main goal of the CPD3 course is to ensure that every student who graduates from MCW medical school achieve our core M3 learning objectives and is ready to start a residency in any field. Student Role – Complete required OSCE components (Int Medicine and Super OSCE) – Complete CPD3 lecture sessions – Ongoing communications with CPD Course Director (s) – Meet one-on-one with director / Dean (scheduled or on demand) – Complete and submit a Self-Assessment/Individualized Learning Plan (prior to one-on-one meetings) reflect and determine specific characteristics and experiences that the student is looking for in a residency program. – Start exploring residency programs, compiling a list of programs of interest and planning for away rotations during the spring of the M3 and the M4 year. – Review a leadership/professionalism article and compose a reflection – Complete remediation plan (if required). The CPD director will monitor, and measure performance and competencies based on their cumulative performance in the required components of the M3 year: - intercession/CPD sessions OSCEs – Clerkships – Acting Internships – Electives – Self-Assessment/Individualized Learning Plan (ILP) The CPD director and/or Dean will track student’s competency levels, evaluations and ILP. The CPD course will meet during the M3 year. During the M3 year, students will meet on one with their CPD director and/or Dean for advising and performance reviews and remediation where required. Students will receive written feed least twice during the academic year. For students with performance concerns the CPD director and/or Dean will consult with Clerkship Directors Committee and Student Affairs and make a recommendation to the Academic Standing Committee regarding remediation recommendations.

INTE D4370 Continuous Professional Development Green Bay. *0.5 credit.*

In this course students will learn about the continuation of the early clinical coursework in the M1 and M2 years to ensure students’ continued competency progression through the M3-M4 years.

INTE D4380 Continuous Professional Development with Capstone: Green Bay. *1 credit.*

The CPD4 Course builds upon the competencies from the M1, M2 and M3 years. The main goal of the CPD4 course is to ensure that every student who graduates from MCW medical school has achieved our core M4 learning objectives and is ready to start a residency in any field. Student Role: Attend all Capstone didactics and complete the skills lab Ongoing communications with CPD Course Director (s) Meet one-on-one with CPD course director or Dean (scheduled or on demand) Complete and submit a Self-Assessment/Individualized Learning Plan (prior to one-on-one meetings) Complete a Residency Application Plan (prior to one-on-one meetings with Assistant Dean) Complete a Fourth Year scheduling Plan discussed in the meeting with assistant Dean Complete a Professional and or Leadership Article Review and Reflection Complete an updated Curriculum Vitae (CV) and personal statement to turn in for review and narrative feedback from the assistant dean or course director. The CPD director or Dean/Assistant Dean will monitor and measure student performance and competencies based on their cumulative performance in the required components of the M4 year: Required sessions/intercessions Acting Internships Electives Self-Assessment/Individualized Learning Plan (ILP) The CPD director and/or Assistant Dean or Dean will monitor and track student’s competency levels, evaluations and ILP. The CPD course will meet during the M4 year and will culminate with the M4 Capstone course just prior to student completion of medical education in the M4 year.

During the M4 year, students will meet one-on-one with their CPD director Assistant Dean and/or Dean for advising and performance reviews and remediation where required. Students will receive written feedback at least twice during the academic year. For students with performance concerns the CPD director, Assistant Dean and/or Dean will consult with Clerkship Directors Committee and Student Affairs and make a recommendation to the Academic Standing Committee regarding remediation recommendations.

Pathway

PWAY D1212 Physicians in the Community GB. *1.5 credits per term.*

The Pathway is a two-year longitudinally formatted course with occasional large group seminars and weekly reserved time for self-directed learning. The desired outcomes include increased knowledge and enrichment in content areas not fully explored in the standard curriculum. For example, students will learn essential qualities and behaviors of physicians which are not solely disease based. The student will engage in learning about not only disease treatment, but health and health interventions, the introduction of the role of the physician in the community, medical ethics, individual, community, population and global health, health disparities, community engagement, and other pertinent topics to physician practice. The Pathway provides support for and emphasis on student scholarship; the scholarly project follows established best practices for student research. Self-directed learning components are based on an Individual Learning Plan, devised between a student and his/her advisor as the student prepares to complete their Community Oriented Primary Care (COPC) project. The COPC project is to be completed by the end of the M2 year and will be presented in a formal presentation.

Medical Scientist Training Program (MD/PhD)

Program Description

There is a national shortage of physician-scientists who can care for patients and conduct state-of-the-art-research. MCW-MSTP was established in 1983 with the mission to support medical and research training culminating in the receipt of both an MD and a PhD degree.

This dual-degree program is only offered at MCW-Milwaukee and is typically completed in eight years. Students will complete the first portion of their studies in the Medical School MD program, and then transition to the Graduate School for PhD studies. Upon earning a PhD, students will return to the Medical School to complete their clinical training and their MD degree.

Admission Requirements

The MSTP Admissions Committee looks at applicants as whole individuals, considering life experiences as well as academic achievement.

- Academic Achievement
- MCAT and GPA
- Substantive Research Experience
- Personal Statement and Essays
- Letters of Recommendation
- Professional Skills
- Commitment to Biomedical Research
- Community Service
- Personal Interview

Applicants must apply online through the [American Medical College Application Service](#) (AMCAS), and select 'Medical College of Wisconsin' as the designated institution and select 'Combined MD-PhD Training' as the preferred program.

Early submission of application materials is strongly encouraged as interview offers are made on a rolling basis.

A completed application includes the following:

- AMCAS Application – deadline November 1
- Medical School Secondary Application and fee – deadline December 2. There is not an additional application for the Medical Scientist Training Program (MSTP).
- Casper Test Results
 - Letters of Recommendation

Letters

The MSTP accepts 3 – 5 letters of recommendation (or a committee composite letter) submitted through AMCAS.

- Example letter writers include previous or current research mentors, instructors, physicians or employers.
- References should come from individuals who know the applicant enough to comment on their research experience and future potential as an independent investigator.
- MSTP has access to letters sent by electronic submission to the MCW Medical School. At least one letter written by a research mentor in support of the applicant's career as a physician-scientist is needed.
- Additional supporting MD/PhD letters after upload may be sent by the faculty member, as an email attachment to the Program: medschool@mcw.edu.

Dates and Deadlines

- **May 1:** Primary (AMCAS) application opens
- **May 30:** Earliest date to submit AMCAS application
- **July 1:** Preferred date by which to submit AMCAS application
- **August 15:** Preferred date by which to submit MCW Secondary application
- **November 1:** AMCAS application deadline (11:59 pm CST)
- **September-April:** Applications are reviewed, and invitations are sent out
- **December 2:** MCW secondary application deadline (4:00 pm CST)
- **January-March:** Two-day virtual interviews on Thursday and Friday. Interviews are for both the MD/PhD (MSTP) and MD. Rolling admissions decisions. A select few may be chosen early; most are offered later in the application cycle.
- **April:** Revisit in early April
- **April 30:** Deadline for all applicants to accept a single offer of MD admission to any institution
- **June:** First summer rotation
- **July:** Second summer rotation
- **Early August:** New student orientation and classes begin

See Doctor of Medicine and PhD sections of this Bulletin for additional information on the curriculum.

[Doctor of Medicine/Master of Public Health Program \(MD/MPH\)](#)

Please see page 163.

[Doctor of Medicine/Master of Science Program \(MD/MS\)](#)

Please see page 169.

Master of Science in Anesthesia Program

Program Description

The Master of Science in Anesthesia (MSA) Program provides high quality education through challenging curriculum and comprehensive clinical teaching. The program prepares safe and competent providers for the surgical patient.

MCW's MSA program is the first in Wisconsin to train anesthesiologist assistants, who will work under the direction of leading physician anesthesiologists after graduation. The curriculum immerses students in all areas of anesthesia knowledge throughout the 28-month program, transforming students into expert clinicians. Based at MCW's Milwaukee campus, the MSA program at MCW teaches to the highest level of professionalism. As part of MCW's Department of Anesthesiology, students learn at top academic medical centers.

Admission Requirements

Providing anesthesia care as a Certified Anesthesiologist Assistant demands mastery of anesthesia knowledge coupled with superior critical thinking and technical skills. To promote success both academically and in patient care, we identify highly qualified applicants that are an excellent "fit": individuals who share our core values and passion for learning. Areas such as academic achievement, interpersonal skills, personal motivation, life experiences, and recommendations all contribute to the admissions process.

Minimum Eligibility Requirements

Bachelor's Degree

In order to apply to the program, applications must have a bachelor's degree from a college or university located in the United States or Canada that is accredited by an organization recognized by the Council for Higher Education Accreditation (CHEA).

GPA

Applicants must earn a minimum cumulative GPA of 2.75 or meet the requirements of the Recent Academic Achievement Pathway. (GPAs include all coursework attempted without grade replacement or grade forgiveness for any repeated courses.)

Test Scores

The Medical College of Wisconsin Master of Science in Anesthesia program does not require the GRE or MCAT exam for submission of application. Applicants who wish to voluntarily submit exam scores may do so by selecting our program's GRE code (7150). For the MCAT, select Medical College of Wisconsin (no code needed).

Letters of Recommendation (3) from individuals who are familiar with the applicant's suitability for graduate study leading into a career in anesthesia clinical practice.

Clinical Anesthesia Shadowing Experience

At least 8 hours of anesthesia shadowing is required. The activity must demonstrate sufficient anesthesia focus by involving an Anesthesiology, Certified Anesthesiologist Assistant, or Nurse Anesthetist. The shadowing experience must be documented on the [Verification of Exposure to Anesthesia Practice form](#) (PDF) or on any similar form that appropriately confirms the shadowing experience.

Physical and Technical Standards

Applicants must meet all physical and technical standards as listed in the [Physical and Technical Standards for the Anesthesiologist Assistant Student Guide](#) (PDF).

Prerequisites

The prerequisites listed below must be taken for a letter grade* and completed with a C or better with official transcripts received by the program prior to the program start date.

Prerequisites must be completed at a college or university in the United States or Canada that is accredited by an organization recognized by the Council for Higher Education Accreditation (CHEA). Applications will still be considered with coursework pending, but transcripts showing successful completion of all prerequisites must be received at least three weeks prior to the program start date for a student to remain eligible to begin the program. College credit for high school Advanced Placement courses do not satisfy the requirement. Students with AP credit in a pre-requisite course may substitute a similar course that is equal to, or higher than, the pre-requisite course. For example, a student with AP credit in Calculus I could substitute Calculus II or Statistics I. For questions regarding appropriate alternative coursework, contact the MSA program (MCWMSA@mcw.edu.)

*Due to significant academic disruption resulting from the COVID-19 pandemic, prerequisite coursework completed with a passing grade on a pass/fail grading scale in the 2019 – 2020 and 2020 – 2021 academic years will be accepted.

- **Biochemistry:** One semester
- **Human Anatomy*:** One semester
 - Courses with lab are recommended but not required
- **Human Physiology*:** One semester
 - Courses with lab are recommended but not required
- **Advanced Mathematics:** One semester
 - Calculus I or Statistics I (Courses designed for health professions or research applications will be accepted provided significant computation is included. Theoretical or conceptual application only is not sufficient.)
- **Biology I with Lab:** One semester
- **Biology II with Lab:** One semester
 - The following courses may be substituted for this requirement: Microbiology, Cell & Molecular Biology, Neurobiology, Genetics
- **Chemistry I with Lab:** One semester
- **Chemistry II with Lab:** One semester
 - The following courses may be substituted for this requirement: Biochemistry II, Organic Chemistry II)
- **Organic Chemistry with Lab:** One semester
- **Physics I with Lab:** One semester
- **Physics II with Lab:** One semester
- **Medical Terminology:** One course

*Combined Anatomy/Physiology courses will be accepted; minimum two semesters required.

Application Process

All interested applicants must complete an application via the Centralized Application Services for Anesthesiologist Assistants (CASAA) by February 1st, annually. All application materials and supporting documentation must be submitted through the CASAA application. The MSA program is unable to accept documents submitted directly to the program.

- Step One: Create an applicant account on [CASAA](#).
- Step Two: Select MCW from the list of programs.
- Step Three: Complete all sections of the application.
- Step Four: Submit your application for verification.
- Step Five: If selected, attend a required interview with the program Admissions Committee.

Important Application Information

- There is no supplemental application. Everything needed for application (fees, instructions) is contained within the CASAA application.
- Application materials must be verified in order for the admissions committee to review materials. Applicants are encouraged to check the status of their application after submission of the full application. Applicants are also encouraged to contact CASAA if, after several weeks, CASAA has not verified the application.
- The MSA program will send email confirmation to an applicant once the application has been verified by CASAA.
- Personal interviews are offered to the most qualified applicants to assess interpersonal and communication skills, professionalism, and leadership. Interviews are required for admission consideration.

Credits Required to

Graduate 100 credits

Required Courses

MSAN 5011 Introduction to Physiology and Pharmacology. *4 credits*

Physiology for the Anesthesiologist Assistant provides a thorough review of human cellular and organ systems physiology as well as introductory concepts in pharmacology (pharmacodynamics, -kinetics, and -genomics).

MSAN 5021 Human Anatomy. *1.5 credits*

Anatomy for the Anesthesiologist Assistant incorporates the relevant human anatomy concepts pertinent to anesthesia practice.

MSAN 5031 Physics for Anesthesia. *1.5 credits*

Physics for Anesthesia reviews relevant physical principles involved in the delivery of anesthesia and in the care of the surgical patient.

MSAN 5111 Anesthesia Equipment and Delivery Systems. *1.5 credits*

Anesthesia Equipment and Delivery Systems reviews the mechanical, electrical, and pneumatic components of anesthesia delivery systems. Applications to practice such as pre-use safety checks are included. In particular an in-depth study of the anesthesia delivery machine, oxygen delivery, and suctioning systems is covered.

MSAN 5121 Perioperative Monitoring. *3 credits*

Perioperative Monitoring provides learners with the relevant knowledge and skills for monitoring perioperative patients through basic and complex anesthetics. The course includes applied physics principles for monitoring equipment, troubleshooting, and planning and selection, as well clinical diagnostics based upon the resulting monitoring data. An emphasis is placed on mechanical ventilators and non-invasive monitoring modalities which comply with the American Society of Anesthesiologists Standards for Basic Anesthetic Monitoring.

MSAN 5131 Ultrasound for Anesthesia. *2 credits*

Ultrasound for Anesthesia will combine lectures and hands-on practice for students to apply ultrasound skills to an array of anesthetic practices. Topics will cover vascular access, peripheral nerve blocks, and an introduction to principles of ultrasound as a diagnostic tool.

MSAN 5211 Foundations in Anesthesia. *2 credits*

Foundations in Anesthesia provides the learner with an introduction to anesthesia concepts. Students will learn basic practices and principles in anesthesia care including foundations in general anesthesia, regional anesthesia, monitored anesthesia care, intravenous catheterization, and pharmacology.

MSAN 5221 Implementation and Management I. *2 credits*

Implementation and Management I is designed to develop anesthesia knowledge tailored to patient comorbidities and surgical procedures with an emphasis on cardiac and pulmonary disease. Anesthesia pharmacology, practice skills, detection, and management of common pathological conditions and postoperative complications are included.

MSAN 5222 Implementation and Management IIa. *1 credit*

Implementation and Management IIa is a continuation of Implementation and Management I and introduces care of the patient with kidney disease, endocrine disorders, and neuropathology. A thorough review of pathophysiology of these conditions is provided along with discussions of their implications in anesthesia care.

MSAN 5223 Implementation and Management IIb. *1 credit*

Implementation and Management IIb is a continuation of Implementation and Management IIa.

MSAN 5311 Patient Assessment I. *0.5 credit*

Patient Assessment I prepares the student to perform a preoperative interview including a focused preoperative medical history, review of the electronic medical record, and physical exam. Students will practice interviewing skills and performing cardiac, pulmonary and airway exams. Application of findings and appropriate use of expert consultants are discussed.

MSAN 5312 Patient Assessment II. *0.5 credit*

Patient Assessment II is a continuation of Patient Assessment I. This course furthers the student's understanding and ability to perform preoperative assessments on patients with both simple and complex medical conditions ranging from mild to severe. Pathophysiology and common pharmacotherapy are presented including perioperative implications. Application of findings to anesthesia planning and appropriate use of expert consultants are discussed.

MSAN 5411 Anesthesia Planning I. *0.5 credit*

Anesthesia Planning I is designed to prepare students for care of the healthy surgical patient while focusing on the knowledge and skills necessary to formulate, organize, prepare and implement an anesthetic plan. Students will learn to plan for the necessary drugs, airway devices, and other tools needed to be fully prepared to manage an average anesthetic.

MSAN 5412 Anesthesia Planning II. *0.5 credit*

Anesthesia Planning II is a continuation of Anesthesia Planning I. This course focuses on creating anesthetic plans for geriatric patients and those with cardiac and pulmonary comorbidities, advanced/invasive selection and complex surgery planning.

MSAN 5413 Anesthesia Planning III. *0.5 credit*

Anesthesia Planning III is a continuation of Anesthesia Planning II and includes planning for patients with kidney disease, endocrine disorders, and neuropathology.

MSAN 5511 Anesthesia Simulation I. *2 credits*

In Anesthesia Simulation I, learners will develop and apply real-time monitoring and decision-making skills necessary for supervised clinical education. This hands-on course is designed to develop skills and apply concepts using high-fidelity simulation, task trainers, and intraoperative equipment. Airway skills and physiologic monitoring will be incorporated into the course activities to create a foundational knowledge of monitored anesthesia care and general anesthesia.

MSAN 5512 Anesthesia Simulation II. *2 credits*

Anesthesia Simulation II is a continuation of Anesthesia Simulation I. In this course, learners will manage more complex patients and develop the knowledge and skills to manage adverse events commonly encountered in anesthesia practice.

MSAN 5513 Anesthesia Simulation IIIa. *1 credit*

Anesthesia Simulation IIIa is a continuation of Anesthesia Simulation II. In this course, learners will participate in advanced simulation including crisis management and anesthesia emergencies.

MSAN 5514 Anesthesia Simulation IIIb. *1 credit*

Anesthesia Simulation IIIb is a continuation of Anesthesia Simulation IIIa.

MSAN 5611 Research Seminar I. *1 credit*

Research has demonstrated that reflective practice is an effective means to foster improved performance and quality outcomes. This course will provide learners with the structure and framework to critically evaluate literature to improve their clinical knowledge base and apply best practices.

MSAN 5711 Introduction to Clinical Anesthesia. *0.5 credit*

In Intro to Clinical Anesthesia, learners will be introduced to the clinical environment to observe anesthesia practices and management as well be introduced to the perioperative environment and policies and practices of patient care through the surgical period.

MSAN 5712 Clinical Anesthesia I. *5 credits*

In Clinical Anesthesia I, learners will apply real-time monitoring and decision-making skills in supervised clinical education. Airway skills, intraoperative diagnostic laboratory analysis, and physiologic monitoring will be incorporated for use during supervised patient care in monitored anesthesia care and general anesthesia.

MSAN 5713 Clinical Anesthesia IIa. *2.5 credits*

Clinical Anesthesia IIa is a continuation of Clinical Anesthesia I. Students will continue their rotations in the clinical environment, developing their skills in real-time supervised management of patients undergoing monitored anesthesia care and general anesthesia.

MSAN 5714 Clinical Anesthesia IIb. *2.5 credits*

Clinical Anesthesia IIb is a continuation of Clinical Anesthesia IIa.

MSAN 5811 Special Topics Anesthesia Ia. *1 credit*

Special Topics in Anesthesia Ia introduces students to the advanced practice concepts of subspecialty anesthesia.

MSAN 5812 Special Topics Anesthesia Ib. *1 credit*

Special Topics in Anesthesia Ib is a continuation of Special Topics in Anesthesia Ia.

MSAN 5911 Professionalism. *0.5 credit*

Professionalism provides a foundation in the ethical, legal, cultural, and professional issues of modern anesthesia care. The course includes topics in professional advocacy, compliance with professional and employer guidelines, and providing care to diverse populations.

MSAN 6223 Implementation and Management III. *2 credits*

Implementation and Management III is a continuation of Implementation and Management IIb and introduces care of the patient with hepatic, hematologic, and neuropsychiatric disorders.

MSAN 6414 Anesthesia Planning IV. *0.5 credit*

Anesthesia Planning IV is a continuation of Anesthesia Planning III. In this course, students will combine their knowledge of pathophysiology, pharmacology, and advanced surgical topics to create detailed anesthetic plans for complex patient and surgical needs.

MSAN 6611 Case Conference. *1 credit*

Case Conference offers students an opportunity to apply reflective practice as a method to improve performance and quality outcomes. This course will provide the structure and framework for students to critically evaluate their own performance and complex case reviews in anesthesia care.

MSAN 6612 Research Seminar II. *0.5 credit*

In Research Seminar II, students will build upon the skill of statistical analysis of published medical literature. Learners will identify topics of interest, perform literature reviews, and develop a poster presentation of a topic in anesthesia.

MSAN 6613 NCCAA Exam Preparation Ia. *0.5 credit*

NCCAA Exam Preparation Ia will serve as a review in preparation for the NCCAA certifying exam. Students will participate in peer teaching activities, practice problem-based learning, and exam-taking skills.

MSAN 6614 NCCAA Exam Preparation Ib. *0.5 credit*

NCCAA Exam Preparation Ib is a continuation of NCCAA Exam Preparation Ia.

MSAN 6615 NCCAA Exam Preparation II. *1 credit*

NCCAA Exam Preparation II is a continuation of NCCAA Exam Preparation Ib.

MSAN 6711 Clinical Anesthesia III. *6 credits*

Clinical Anesthesia III is a continuation of Clinical Anesthesia IIb. Students will continue their rotations in the Clinical environment, further developing their skills in the supervised clinical environment.

MSAN 6712 Clinical Anesthesia IV. *15 credits*

Clinical Anesthesia within the final year of training involves sub-specialty training. Specialty rotations include pediatric, obstetric, cardiac, thoracic, trauma, regional/acute pain, and neuroanesthesia. General rotations are also included in this course. Students will develop autonomy and ability in anesthesia practice with the goal to become a competent and safe provider in all areas of anesthesia practice and surgical procedures.

MSAN 6713 Clinical Anesthesia Va. *7.5 credits*

Clinical Anesthesia Va is a continuation of Clinical Anesthesia IV. Students will continue their rotations in sub-specialty and general practice areas.

MSAN 6714 Clinical Anesthesia Vb. *7.5 credits*

Clinical Anesthesia Vb is a continuation of Clinical Anesthesia Va.

MSAN 6715 Clinical Anesthesia VI. *15 credits*

Clinical Anesthesia VI is a continuation of ANES Clinical Anesthesia Vb. Students will continue their rotations in sub-specialty and general practice areas.

MSAN 6812 Special Topics Anesthesia II. *1 credit*

This is a continuation of Special Topics in Anesthesia Ib.

School of Pharmacy

Doctor of Pharmacy

Program Description

The accelerated three-year Doctor of Pharmacy (PharmD) program provides students with early access to clinical experiences, hands-on training in advanced practice skills such as physical assessment and interprofessional education experiences with a variety of other healthcare professionals and students.

Admission Requirements Eligibility

Applicants must complete an application through [PharmCAS](#). The final application deadline is June 1. Applications completed and submitted by this deadline will be given full consideration for admission to the MCW Pharmacy School.

Effective March 12, 2020, completion of the Pharmacy College Admission Test (PCAT)/Medical College Admission Test (MCAT) is not required; rather, it is optional. Applicants who believe the PCAT/MCAT provides evidence of academic preparedness for the MCW PharmD program are encouraged to submit their scores to PharmCAS. For example, this could apply to students at or near the minimum cumulative/prerequisite GPA requirement or students who completed science prerequisite coursework more than seven years ago.

Applicants who meet the minimum requirements and do not complete or submit PCAT/MCAT scores will receive a holistic application review and be considered competitive candidates for the Doctor of Pharmacy program.

Applicants must complete the minimum pre-pharmacy requirements (see below) at an accredited college or university in the United States or Canada. All pre-pharmacy requirements must be completed by June 30. Students considering applying for admission to the MCW Pharmacy School must complete 90 credit hours of undergraduate study prior to matriculation.

Applicants must achieve the minimum cumulative undergraduate GPA of 2.0 on a 4.0 scale as calculated by the MCW Pharmacy School. The average cumulative GPA for the most recently admitted cohort of students was 3.10.

Applicants must achieve the minimum prerequisite GPA of 2.5 on a 4.0 scale as calculated by the MCW Pharmacy School. The average prerequisite GPA for the most recently admitted cohort of students was 3.20.

Applicants must submit three professional or academic references by the appropriate deadline. Letters of recommendation must be submitted through PharmCAS.

Applicants must demonstrate the proper motivation for, and commitment to, the profession of pharmacy through previous health-related work, volunteer experiences, research, or other related experiences.

Applicants must complete, and submit via PharmCAS, a personal statement demonstrating written communication skills necessary to interact successfully with patients and colleagues.

Applicants must complete the MCW Pharmacy School applicant interview process, by invitation only.

Prerequisite Course List

Prerequisite	Required	Recommended
General Biology	2 Courses (lab optional)	Foundations of Biology, Ecology, Zoology, Botany, Marine Biology, General Biology, Human Structure, Cell Biology, Microbiology, Animal Physiology
Advanced Biology	2 Courses (lab optional)	Genetics, Neuroscience, Cellular Biology, Molecular Biology, Physiology, Pathophysiology, A&P 1 & 2, Bacteriology, Immunology, Biomedical Sciences, Molecular Genetics, Genomics
General Chemistry	3 Courses (lab optional)	General Chemistry 1 & 2, Inorganic Chemistry, Analytical Chemistry, Biochemistry
Organic Chemistry	2 Courses with at least 1 lab	
Statistics	1 Course	Intro to Statistics, Biostatistics, Data Analysis, Accounting or Business Statistics
College Algebra	1 Course	Must be a 100 level or higher Math course. We will accept Calculus, Trigonometry, Calculus with Geometry
English	1 Course	Must be a 100 level or higher English, Literature, Reading or Writing course
Public Speaking	1 Course	Must be a 100 level or higher Public Speaking, Speech, or Communication course
General Education	4 Courses	Physics, Economics, Calculus, Ethics, Humanities, Social Sciences, Religion. No studio Art, Theater, or Physical Education

1. Prerequisites must be completed at a regionally accredited university, college or community college in the U.S. or Canada.
2. Online and hybrid taught classes only from a regionally accredited university, college or community college in the U.S. or Canada.
3. Prerequisites must be a minimum of three semester credits or approximate quarter hours and be completed with a grade of C or better (pass or satisfactory on a competency-based scale).
4. General Education courses may not include studio, performance or physical education.
5. A maximum of 12 credits of Advanced Placement (AP), International Baccalaureate (IB), Postsecondary Enrollment Options (PSEO) or College in the Schools (CIS) credit may be accepted if it appears on a college transcript. These credits may not count toward the 90-credit hour minimum required for matriculation.
6. English as a Second Language (ESL) and English Language Learners (ELL) classes cannot satisfy the English or Public Speaking course requirements.
7. Science courses must be completed within seven years of the desired year of entry.
8. A final official transcript will be required prior to the start of classes in the desired year of entry.

Credits Required to Graduate 181 credits

2,240 clinical practice hours

Program Requirements

All students in the School of Pharmacy must successfully complete all required courses as well as two [electives](#).

Required Courses

PHAR 510 Biochemistry. *3 credits*

Students will learn about basic principles in biochemistry with a particular emphasis on pharmaceutical applications. Students will engage in lectures and interactive discussion regarding the integration of therapeutic agents into the body's natural pathways to manage and treat disease states. This course introduces topics such as acid/base chemistry, structure and function relationships of proteins, enzymes in biochemistry, and major pathways for protein, carbohydrate, and lipid metabolism, and pertinent nutritional topics to build a foundation in the understanding of basic sciences with an application to pharmacy.

PHAR 511 Genetics and Clinical Immunology. *3 credits*

Students will learn about individual differences in metabolizing enzymes, transporters, and other biochemicals impacting drug disposition and action that underpin the practice of personalized medicine. Students will engage in topics addressing nucleic acid structure, the flow of information from DNA to protein, current techniques in DNA technology including gene therapy and pharmacogenetics, the molecular basis of cancer and several topics in clinical genetics. This course serves as a foundational basis and introduces pharmaceutical applications to the topics addressed. In the Immunology section of the course, students will learn basic clinical immunology relevant for future practice. Students will engage in topics addressing non-specific host defense mechanisms, specific immunity, and products that impart active and passive immunity to both host and microorganisms. The course emphasizes mechanisms of vaccination, hypersensitivity, autoimmune disorders, immunity to influenza virus and the application of that knowledge for the treatment of related human diseases.

PHAR 512 Human Anatomy and Physiology. *3 credits*

Students will learn about individual differences in metabolizing enzymes, transporters, and other biochemicals impacting drug disposition and action that underpin the practice of personalized medicine. Students will engage in topics addressing nucleic acid structure, the flow of information from DNA to protein, current techniques in DNA technology including gene therapy and pharmacogenetics, the molecular basis of cancer and several topics in clinical genetics. This course serves as a foundational basis and introduces pharmaceutical applications to the topics addressed. In the Immunology section of the course, students will learn basic clinical immunology relevant for future practice. Students will engage in topics addressing non-specific host defense mechanisms, specific immunity, and products that impart active and passive immunity to both host and microorganisms. The course emphasizes mechanisms of vaccination, hypersensitivity, autoimmune disorders, immunity to influenza virus and the application of that knowledge for the treatment of related human diseases.

PHAR 520 Pharmaceutical Drug Delivery I: Non-Sterile Products. *4 credits*

Students will learn about the physicochemical properties of drugs and drug delivery systems. Students will engage in a pharmaceutical laboratory experience demonstrating compounding, preparation, dispensing, and the administration of prescription drugs. This course introduces topics pertaining to drug stability, delivery, release, disposition, pharmacokinetics, therapeutic effectiveness, and the development of quality standards for drug products with an emphasis on calculations applicable to compounding and patient dosing.

PHAR 521 Pharmaceutical Drug Delivery II: Sterile Products. *4 credits*

Students will continue to build on topics learned in pharmaceutical drug delivery I with a larger focus on sterile and parenteral products. Students will engage in a hands-on laboratory experience utilizing the techniques and devices necessary for compounding safe and sterile products. This course reinforces calculations utilized for proper drug compounding, dosing, and administration with a focus on patient safety.

PHAR 530 Patient Care Laboratory I. *2 credits*

In this 8-quarter laboratory sequence, students will learn and practice professional skills needed for contemporary and future practice of pharmacy. In each course, students will engage in skills-based learning which aligns with material in concurrent coursework, learn new skills which prepare them for future experiential activities, and reinforce and integrate skills learned earlier in the curriculum. The course sequence will involve frequent use of simulation, group work, and interprofessional teamwork.

PHAR 531 Patient Care Laboratory II. *2 credits*

In this 8-quarter laboratory sequence, students will learn and practice professional skills needed for contemporary and future practice of pharmacy. In each course, students will engage in skills-based learning which aligns with material in concurrent coursework, learn new skills which prepare them for future experiential activities, and reinforce and integrate skills learned earlier in the curriculum. The course sequence will involve frequent use of simulation, group work, and interprofessional teamwork.

PHAR 532 Patient Care Laboratory III. *2 credits*

In this 8-quarter laboratory sequence, students will learn and practice professional skills needed for contemporary and future practice of pharmacy. In each course, students will engage in skills-based learning which aligns with material in concurrent coursework, learn new skills which prepare them for future experiential activities, and reinforce and integrate skills learned earlier in the curriculum. The course sequence will involve frequent use of simulation, group work, and interprofessional teamwork.

PHAR 533 Patient Care Laboratory IV. *2 credits*

In this 8-quarter laboratory sequence, students will learn and practice professional skills needed for contemporary and future practice of pharmacy. In each course, students will engage in skills-based learning which aligns with material in concurrent coursework, learn new skills which prepare them for future experiential activities, and reinforce and integrate skills learned earlier in the curriculum. The course sequence will involve frequent use of simulation, group work, and interprofessional teamwork.

PHAR 540 Introduction to Pharmacy Practice. *2 credits*

This course prepares students to be professionally competent for Introductory Pharmacy Practice Experiences (IPPEs). Students will learn the foundational legal and safety regulations necessary to be a successful participant during the IPPEs. Students will engage in activities to prepare them for a proactive and professional role in their careers.

PHAR 541 Introductory Pharmacy Practice Experience I. *2 credits*

This course is composed of two related experiences – an introductory pharmacy practice rotation and seminar – and provides foundational activities that integrate knowledge and skills. Students will apply to professional practice the facts, information, and concepts gained in didactic coursework. Students will learn about the profession of pharmacy and the role pharmacists play in advancing pharmacy practice, as well as principles of professionalism, change management, interprofessional collaborative practice, law, and ethics. Students will engage in activities designed to facilitate career planning, continuous professional development, and the development of personal and professional leadership skills.

PHAR 542 Introductory Pharmacy Practice Experience II. *2 credits*

This course is composed of two related experiences – an introductory pharmacy practice rotation and seminar – and provides foundational activities that integrate knowledge and skills. Students will apply to professional practice the facts, information, and concepts gained in didactic coursework. Students will learn about the profession of pharmacy and the role pharmacists play in advancing pharmacy practice, as well as principles of professionalism, change management, interprofessional collaborative practice, law, and ethics. Students will engage in activities designed to facilitate career planning, continuous professional development, and the development of personal and professional leadership skills.

PHAR 543 Introductory Pharmacy Practice Experience III. *2 credits*

This course is composed of two related experiences – an introductory pharmacy practice rotation and seminar – and provides foundational activities that integrate knowledge and skills. Students will apply to professional practice the facts, information, and concepts gained in didactic coursework. Students will learn about the profession of pharmacy and the role pharmacists play in advancing pharmacy practice, as well as principles of professionalism, change management, interprofessional collaborative practice, law, and ethics. Students will engage in activities designed to facilitate career planning, continuous professional development, and the development of personal and professional leadership skills.

PHAR 550 Health Care Systems and Patient Safety. *3 credits*

Students will learn the structure and organization of the various health care systems and how they impact professionals today. Students will engage in projects examining critical issues surrounding patient safety and the modern delivery of medication and health services. This course introduces concepts of drug development, medication use principles, the importance of safety in patient care systems and practices, and the role that informatics and automation play in enhancing a safe and effective medication use process.

PHAR 551 Evidence-Based Practice. *3 credits*

Students will learn principles in research methods and study design, biostatistics, and literature evaluation as it relates to evidence based practice. Students will critically evaluate and interpret scientific literature to utilize the best evidence available in making patient-care decisions.

PHAR 552 Population Health. *3 credits*

Students will develop a broad understanding of health and its determinants, the major issues affecting population health, and management strategies for global, national, and community-based public health programs. Students will engage in the implementation of activities that advance public health and wellness. This course introduces the application of economic principles and theories to the provision of cost-effective pharmacy products and services that optimize patient-care outcomes, particularly in situations where healthcare resources are limited.

PHAR 560 Self-Care and Wellness. *3 credits*

In this course students will learn about the use of over-the-counter (OTC) and self-care medications. Students will engage in lectures and case studies examining commonly encountered self-managed disease states. This course reinforces patient assessment and communication skills needed in the delivery of health care and patient counseling.

PHAR 561 Integrated Sequence: Principles of Drug Action, Pharmacogenomics. *5 credits*

Students will learn concepts and general principles underlying drug action and therapeutics, including enzyme and receptor pharmacology, structure-activity relationship and concepts in pharmacokinetics, pharmacodynamics, and pharmacogenomics as they relate to drug action. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner.

PHAR 562 Integrated Sequence: Infectious Diseases I. *5 credits*

Students will learn about the microbiology, pharmacology, medicinal chemistry, pharmacotherapeutics, pharmaceuticals, and pharmacogenomics of infectious diseases in an integrated, interdisciplinary course structure. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course.

PHAR 563 Integrated Sequence: Renal and Cardiovascular. *5 credits*

Students will learn about the pharmacology, medicinal chemistry, pharmacotherapeutics, pharmaceuticals, and pharmacogenomics of renal and cardiovascular disorders in an integrated, interdisciplinary course structure. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course.

PHAR 564 Integrated Sequence: Infectious Diseases II. *5 credits*

In this second course of a two-part series, students will continue exploring the microbiology, pharmacology, medicinal chemistry, pharmacotherapeutics, pharmaceuticals, and pharmacogenomics of infectious diseases in an integrated, interdisciplinary course structure. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course.

PHAR 630 Patient Care Laboratory V. *2 credits*

In this 8-quarter laboratory sequence, students will learn and practice professional skills needed for contemporary and future practice of pharmacy. In each course, students will engage in skills-based learning which aligns with material in concurrent coursework, learn new skills which prepare them for future experiential activities, and reinforce and integrate skills learned earlier in the curriculum. The course sequence will involve frequent use of simulation, group work, and interprofessional teamwork.

PHAR 631 Patient Care Laboratory VI. *2 credits*

In this 8-quarter laboratory sequence, students will learn and practice professional skills needed for contemporary and future practice of pharmacy. In each course, students will engage in skills-based learning which aligns with material in concurrent coursework, learn new skills which prepare them for future experiential activities, and reinforce and integrate skills learned earlier in the curriculum. The course sequence will involve frequent use of simulation, group work, and interprofessional teamwork.

PHAR 632 Patient Care Laboratory VII. *2 credits*.

In this 8-quarter laboratory sequence, students will learn and practice professional skills needed for contemporary and future practice of pharmacy. In each course, students will engage in skills-based learning which aligns with material in concurrent coursework, learn new skills which prepare them for future experiential activities, and reinforce and integrate skills learned earlier in the curriculum. The course sequence will involve frequent use of simulation, group work, and interprofessional teamwork.

PHAR 633 Patient Care Laboratory VIII. *2 credits*

In this 8-quarter laboratory sequence, students will learn and practice professional skills needed for contemporary and future practice of pharmacy. In each course, students will engage in skills-based learning which aligns with material in concurrent coursework, learn new skills which prepare them for future experiential activities, and reinforce and integrate skills learned earlier in the curriculum. The course sequence will involve frequent use of simulation, group work, and interprofessional teamwork.

PHAR 640 Introductory Pharmacy Practice Experience IV. *2 credits*

This course provides a foundational sequence of activities that integrate knowledge and skills. Students will learn about the profession of pharmacy and the role pharmacists will play in advancing pharmacy practice. This course is designed to allow students to apply the facts, information and concepts gained in didactic coursework to professional practice. Students will engage in reflection, group work, and other activities designed to facilitate career planning, continuous professional development, and the development of personal and professional leadership skills. Students will learn the principles of professionalism, change management, advocacy, and interprofessional collaborative practice.

PHAR 641 Introductory Pharmacy Practice Experience V. *2 credits*

This course is composed of two related experiences – an introductory pharmacy practice rotation and seminar – and provides foundational activities that integrate knowledge and skills. Students will apply to professional practice the facts, information, and concepts gained in didactic coursework. Students will learn about the profession of pharmacy and the role pharmacists play in advancing pharmacy practice, as well as principles of professionalism, change management, interprofessional collaborative practice, law, and ethics. Students will engage in activities designed to facilitate career planning, continuous professional development, and the development of personal and professional leadership skills.

PHAR 642 Introductory Pharmacy Practice Experience VI. *2 credits*

This course is composed of two related experiences – an introductory pharmacy practice rotation and seminar – and provides foundational activities that integrate knowledge and skills. Students will apply to professional practice the facts, information, and concepts gained in didactic coursework. Students will learn about the profession of pharmacy and the role pharmacists play in advancing pharmacy practice, as well as principles of professionalism, change management, interprofessional collaborative practice, law, and ethics. Students will engage in activities designed to facilitate career planning, continuous professional development, and the development of personal and professional leadership skills.

PHAR 643 Introductory Pharmacy Practice Experience VII. *2 credits*

This course is composed of two related experiences – an introductory pharmacy practice rotation and seminar – and provides foundational activities that integrate knowledge and skills. Students will apply to professional practice the facts, information, and concepts gained in didactic coursework. Students will learn about the profession of pharmacy and the role pharmacists play in advancing pharmacy practice, as well as principles of professionalism, change management, interprofessional collaborative practice, law, and ethics. Students will engage in activities designed to facilitate career planning, continuous professional development, and the development of personal and professional leadership skills.

PHAR 650 Practice Development and Management. *3 credits*

Students will learn about a broad spectrum of business practices and methods vital to establishing and maintaining a successful innovative pharmacy practice. Students will engage in case discussions and various interactive and didactic teaching modalities to apply skills to successfully operate a clinical practice. The course includes management theories, motivational theories, employment issues, methods of negotiation, strategic planning, SWOT analysis, and continuous quality improvement.

PHAR 651 Pharmacy Law. *2 credits*

Students will learn federal and state statutes, regulations, and policies that govern the practice of pharmacy, including the mitigation of prescription drug abuse and diversion. As law is best learned when applying it to specific situations and cases, students will engage in case discussions and problem-solving activities to apply law to current and future pharmacy practice problems.

PHAR 660 Integrated Sequence: Advanced Cardiovascular. *5 credits*

Students will learn about the pharmacology, medicinal chemistry, pharmacotherapeutics, pharmaceuticals, and pharmacogenomics of chronic heart failure, ischemic heart disease, arrhythmias, and other acute cardiovascular conditions in an integrated, interdisciplinary course structure. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course.

PHAR 661 Integrated Sequence: Endocrine. *5 credits*

Students will learn about the pharmacology, medicinal chemistry, pharmacotherapeutics, pharmaceuticals, and pharmacogenomics of endocrine disorders in an integrated, interdisciplinary course structure. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course.

PHAR 662 Integrated Sequence: Respiratory, Pain, Inflammation. *5 credits*

Students will learn about the pharmacology, medicinal chemistry, pharmacotherapeutics, pharmaceuticals, and pharmacogenomics of respiratory, pain, and inflammatory disorders in an integrated, interdisciplinary course structure. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course.

PHAR 663 Integrated Sequence: Neurology and Behavioral Health. *5 credits*

Students will learn about the pharmacology, medicinal chemistry, pharmacotherapeutics, pharmaceuticals, and pharmacogenomics of psychiatric and neurologic disorders in an integrated, interdisciplinary course structure. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course.

PHAR 664 Integrated Sequence: Immunological and Gastrointestinal Disorders. *5 credits*

Students will learn about the pharmacology, medicinal chemistry, pharmacotherapeutics, pharmaceuticals, and pharmacogenomics of immunological and gastrointestinal disorders in an integrated, interdisciplinary course structure. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course.

PHAR 665 Integrated Sequence: Hematology and Oncology. *5 credits*

Students will learn about the pharmacology, medicinal chemistry, pharmacotherapeutics, pharmaceuticals, and pharmacogenomics of hematologic and oncologic disorders in an integrated, interdisciplinary course structure. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course.

PHAR 666 Integrated Sequence: Special Populations. *5 credits*

Students will learn about applying didactic knowledge of the pharmacology, medicinal chemistry, pharmacotherapeutics, pharmaceuticals, and pharmacogenomics to tailoring treatment to focused populations in an integrated, interdisciplinary course structure. Special populations will include Women's Health, Men's Health, Pediatrics, Geriatrics, and select Vulnerable Populations. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course.

PHAR 667 Integrated Sequence: Critical Care, Toxicology, Substance Abuse. *5 credits*

Students will learn about the pharmacology, medicinal chemistry, pharmacotherapeutics, and pharmaceuticals of critical care disorders, toxicology, and substance abuse in an integrated, interdisciplinary course structure. Students will engage in various interactive and didactic teaching modalities to explore these concepts and use the knowledge gained to critically approach and solve patient care problems in an evidence-based manner. This course will integrate material from previous courses in a progressive manner and align with learning activities in the concurrent skills laboratory course. The final portion of this course will serve as a capstone in which material from all previous IS courses will be integrated into a series of patient cases.

PHAR 700 Personal and Professional Development. *0 credit*

Activities and experiences that are purposely developed and implemented to ensure an array of opportunities for students to document competency in the affective domain-related expectations of approaches to patient care and personal and professional development. Co-curricular activities complement and advance the learning that occurs within the formal didactic and experiential curriculum.

PHAR 740 Advanced Practice Pharmacy Experience: Community. *6 credits*

The student gains experience in community pharmacy practice including, but not limited to, dispensing procedures, pharmacy law, practice management, and over-the-counter and prescription pharmacotherapy assessment. The student performs medication list retrieval, patient education, clinical documentation, and other patient care skills as appropriate for the rotation site. The student may be exposed to a variety of health care conditions, including but not limited to infectious diseases, disorders of coagulation, cardiopulmonary disorders, endocrine disorders, respiratory conditions, men and women's health, and self-care pharmacotherapy.

PHAR 741 Advanced Pharmacy Practice Experience: Hospital/Health System. *6 credits*

This rotation provides the opportunity for the student to build on knowledge and skills acquired through didactic education and prior rotation experiences to apply to the care of patients within a hospital or health-system setting. The student is exposed to daily pharmacy operations as well as acute care of patients. The student may participate in a variety of activities, including but not limited to: medication list retrieval; providing education to patients and other health care providers; medication monitoring and dosing; clinical documentation; verifying the accuracy of prepared medications; and ensuring maintenance of operational procedures. The student also participates in activities related to medication safety, quality, administration, and drug policy.

PHAR 742 Advanced Pharmacy Practice Experience: Ambulatory Patient Care. *6 credits*

This rotation occurs in a variety of practice settings including, but not limited to, community retail pharmacies, hospital outpatient pharmacies, clinics, and physician offices. The student is an active participant on the interdisciplinary team and engages in activities involving the delivery of quality, comprehensive pharmaceutical care. These activities may include clinical care conferences, patient education and interviewing, drug therapy monitoring, developing and presenting care recommendations, physical assessments, point-of-care testing, and drug information questions. The student actively participates in the health care decision-making process, especially as it pertains to drug therapy. The student may be exposed to a variety of health care conditions, including but not limited to infectious diseases, disorders of coagulation, cardiac disorders, diabetes mellitus, respiratory conditions, and self-care pharmacotherapy.

PHAR 743 Advanced Pharmacy Practice Experience: Inpatient Care. *6 credits*

This rotation occurs in an inpatient, acute care setting. The student develops and explores their roles in an interdisciplinary health care team and refines skills in pharmacotherapy, pharmacokinetics, drug information retrieval and evaluation, verbal and written communication, patient monitoring, and case presentation. The student applies didactic clinical coursework to the care of the hospitalized patient and actively participates in the health care decision-making process. The student encounters a variety of patient populations, including but not limited to, renal failure, infectious diseases, disorders of coagulation, cardiac disorders, diabetes mellitus, and respiratory conditions.

In addition to the aforementioned Advanced Pharmacy Practice Experience (APPE) requirements, students must also complete three additional APPE electives from the [course catalog](#) for a total of 7 APPES (42 credits).



MCW Organizational Chart & Student Services

MCW Organizational Chart

The elected members of the Medical College of Wisconsin's Board of Trustees meet regularly to provide strategic direction in support of MCW's missions and strategic initiatives.

For a list of MCW Student Services (Financial Aid & Tuition, Office of the Registrar, Academic Support & Enrichment, Health & Wellness, Student Inclusion, MCW Libraries) please see the Student Services website.

Faculty

Abedin, Sameem MD, Assistant Professor, Medicine
Abibo, Lolia MD, Assistant Professor, Medicine
Abid, Haisam MD, Assistant Professor, Medicine
Abid, Muhammad Bilal MD, Assistant Professor, Medicine
Abourashed, Ehab A PhD, Professor, School of Pharmacy Administration
Abushanab, Elham Emad MD, Assistant Professor, Neurology
Acharya, Kartikey MD, Assistant Professor, Medicine
Acharya, Krishna Kartikey MBBS, Associate Professor, Pediatrics
Acharya, Pramod MD, Assistant Professor, Medicine
Adams, Alex A MD, Assistant Professor, Anesthesiology
Adams, Samuel J. MD, Assistant Professor, Neurology
Addagatla, Naveen K MD, Assistant Professor, Neurology
Adio, Babajide DO, Assistant Professor, Medicine
Adrians, Noah PhD, Assistant Professor, Psychiatry and Behavioral Medicine
Adsit, Graham S. MD, Assistant Professor, Medicine
Afolayan, Adeleye James MD, Associate Professor, Pediatrics
Agab, Mohamed MBBS, Assistant Professor, Medicine
Agarwal, Mohit MD, Adjunct Associate Professor, Radiology
Agrawal, Dilpesh S MD, Assistant Professor, Medicine
Agrawal, Himanshu MD, Associate Professor, Psychiatry and Behavioral Medicine
Ahmad, Baseer MD, Associate Professor, Ophthalmology and Visual Sciences
Ahmad, Muhammad Imtiaz MBBS, Assistant Professor, Medicine
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