

INTERDISCIPLINARY PH.D. IN BIOMEDICAL SCIENCES PROGRAM

The PhD Program in Biomedical Sciences at DMU aims to train future biomedical scientists and, in conjunction with DMU's doctoral programs in medicine and podiatry, physician-scientists with a broad knowledge of the foundational disciplines (biochemistry, molecular genetics, physiology, pharmacology, pathology, microbiology, and immunology) for a career in biomedical research. An emphasis of the program is the integration of these disciplines to answer questions of broad biomedical impact. A feature of the PhD program is the significant coursework overlap with the doctoral program in medicine. This allows PhD students to explore the clinical application of the foundational disciplines to human health and disease. Graduate faculty are highly trained and are actively engaged in collaborative research, providing an opportunity for broad and high-quality training of our PhD students.

MISSION

Our mission is to train the next generation of biomedical scientists or physician-scientists who will improve human lives via contributions to scientific breakthroughs.

VISION

The PhD Program in Biomedical Sciences at DMU will be recognized as a high-quality doctoral program that broadly trains biomedical scientists or physician-scientists (in conjunction with DMU's Osteopathic and Podiatric medical programs).

PROGRAM REQUIREMENTS

To be considered for admission applicants must have a bachelor's degree with a broad background in biological sciences or related disciplines from a regionally accredited college or university prior to the start of matriculation.

Applicants must submit entrance exam (e.g., GRE, MCAT, DAT) scores during the application process; scores must be within three years of matriculation. The minimum grades required for application are a 3.0 cumulative GPA and a 3.0 science GPA on a 4.0 scale.

Additional information can be found on the PhD Program in Biomedical Sciences Admissions Requirements [website](#).

PROGRAM APPLICATION PROCESS

Application to the PhD Program in Biomedical Sciences is accepted through the DMU website. In addition, three letters of recommendation are required to complete the file prior to review by the Admissions Committee. Detailed information regarding the process can be found on the PhD Program in Biomedical Sciences program admissions [website](#).

Applicants' admissions accounts will reflect status updates throughout the process.

A student may request transfer credit for previous graduate work completed at other regionally accredited (or equivalent) educational institutions. The request should be submitted in writing to the Program Director who will carefully review the content of previous completed credits and forward the request to the Biomedical Sciences Coordinating

Committee. Requests for transfer of credits can only be accepted once a student has matriculated in the program. Courses eligible for transfer credit must be at graduate level, have been completed within the last three years, and received a grade of "B" or higher. Approved transfer credits will be entered on the student's permanent record by the Office of the Registrar. No more than 18.0 credit hours of approved graduate work will be applied toward the degree.

Students who have graduated from DMU's Master of Science in Biomedical Sciences (MSBS) program and are accepted into the Ph.D. program may receive advanced standing for required courses completed as an MSBS student. Courses must have been completed within the last three years and students must have earned a minimum of a "B" grade in order to be considered for advanced standing credit. Credit is awarded after consultation and approval by the course director(s), program director, and the associate dean/dean. If approved, advanced standing courses will be waived, and additional research credits are required in their place. Students must still complete the total credit hours required in the Ph.D. program.

DMU's Master of Science in Biomedical Sciences (MSBS) graduates who are accepted into the Ph.D. program and continue the same lab research may receive advanced standing credit for research previously completed under the MSBS program. If approved, up to 21.0 advanced standing credits in research can be granted. This may result in the student being required to complete a three-year curriculum rather than four-year curriculum in the PhD program making the student eligible to receive a stipend for three years. Students should consult the Accounting Department for more information on stipend eligibility.

CURRICULUM OVERVIEW AND OUTLINE

The curriculum of the PhD Program in Biomedical Sciences aims to 1) provide foundational knowledge for research in biomedical sciences; 2) promote critical thinking in biomedical science research; 3) promote responsible research conduct in the biomedical sciences; 4) train in analytical skills in biomedical science research; and 5) support scientific communication and grantsmanship. Additional content specific to each student's area of study will also be strengthened via additional course work internally or externally. In addition, the program offers training in teaching skills, allowing for an all-round academic training experience.

The PhD Program in Biomedical Sciences is a 4-year program that offers 86.5 credit hours with 40 credit hours of research and 46.5 credit hours of coursework, including discipline-specific content, dissertation proposal preparation and presentation, and dissertation writing and defense. Most coursework is completed in the first two years, with the exceptions of discipline-specific content and seminars in biomedical sciences, which are distributed from the second to the last year. The selection of area of study is carried out early in the recruitment stage of the program. Students work in a highly interactive and collaborative environment, including interactions with dedicated faculty from multiple disciplines, doctoral students in the medical program, master students and undergraduate students.

PROGRAM LEARNING OUTCOMES

The following learning outcomes describe the values and skills that are demonstrated by graduates of the PhD Program in Biomedical Sciences

1. Apply knowledge of scientific theories and approaches to address important questions in their specific area of study.
2. Critically assess hypotheses, study designs and experimental outcomes to achieve high-quality results.

3. Demonstrate high standards of research conduct in biomedical sciences.
4. Apply strong analytical skills to gain high-quality research data in biomedical sciences.
5. Demonstrate strong scientific communication skills and grantsmanship.

CONTINUOUS QUALITY IMPROVEMENT

The College of Osteopathic Medicine is committed to delivering high-quality training to ensure the academic and professional success of its students. Assessment and improvement of student learning in the program will be carried out in various formats.

Student learning in didactic courses will be assessed based on their performance in exams and, in courses that require student preparation, their self-study efforts. Formative and summative assessment methods vary in format to provide an all-round evaluation of student learning and timely adjustment of content delivery.

Learning in the laboratory environment will be assessed each term using rubrics that evaluate the student on various aspects of the development of a biomedical scientist, including working relationships; reliability/commitment; record keeping; trouble-shooting; procedures and techniques; self-directed learning; experimental design/hypothesis testing; conducting and documentation of experiments; and depth of knowledge in the chosen field of study. The rubrics will provide ratings ranging through Unsatisfactory, Low Novice, Novice, High Novice, Low Beginner, Beginner, High Beginner, Low Proficient, Proficient, High Proficient, to various levels of Advanced performance, and will define the expectations associated with each rating. The research mentor will discuss each evaluation with the student and, when necessary, with the program director, to outline a plan of action to improve student learning. The program focuses on growth and development and students are expected to progress through the rating levels, from Novice to Advanced, as they move through their program of study.

Graduate committee meetings will be held frequently to assess the student's learning and progress in the chosen course of study. These meetings are aimed towards setting practical goals for the student to reach completion of the program.

A Student Learning Assessment Report will be generated based on the program learning outcomes and university-wide student learning outcomes. This report will be assessed annually.

TECHNICAL STANDARDS FOR ADMISSION, ACADEMIC PROMOTION AND GRADUATION

The purpose of this document is to specify the technical standards the University deems necessary for a student to matriculate, remain in good standing and ultimately achieve all the competencies necessary for graduation within their program. The University, therefore, requires candidates to confirm their ability to comply with these standards, with or without accommodation, as a condition of admission and on an annual basis thereafter.

Fulfillment of the technical standards for graduation does not guarantee that a graduate will be able to fulfill the technical requirements of any specific residency program or employment setting.

A candidate seeking a PhD in Biomedical Sciences degree at Des Moines University must be capable of completing core educational requirements and achieving the competencies in the basic and applied sciences. DMU seeks to develop candidates who have a deep and robust medical knowledge base, with the ability to appropriately apply it, effectively interpret information, and contribute to decisions across a broad spectrum of laboratory situations in all settings. The critical skills required to be successful are outlined below, and include the ability to observe, communicate, perform motor functions, as well as to understand, integrate core knowledge and skills, and to behave appropriately in varied educational and professional situations.

Reasonable accommodations may be required by otherwise qualified individual candidates to meet the technical standards specified below. Requests for University-provided accommodations will be granted if the requests are reasonable, do not cause a fundamental alteration of the medical education program, do not cause an undue hardship, are consistent with the standards of the profession, and are recommended by the Accommodations and Educational Support Specialist.

1. **Observation:** Candidates and students must be able to acquire required information and timely interpret demonstrations, experiments, and laboratory exercises in the basic sciences.
2. **Communication:** Candidates and students must be able to demonstrate proficiency in the English language such that they can communicate effectively in oral and written form with all members of the classroom and laboratory team. Candidates and students must be able to communicate with peers and advisors in order to elicit and share information. They must have the capacity for comfortable verbal and non-verbal communication and interpersonal skills to enable effective collaboration within a multidisciplinary team. In any case where a candidate's ability to communicate is compromised, the candidate must demonstrate alternative means and/or abilities to communicate with teams.
3. **Motor and Sensory:** Candidates and students must have sufficient motor and tactile function to execute movements reasonably required to perform basic laboratory tests. Such actions may require coordination of both gross and fine muscular movements, equilibrium, and functional use of the senses of touch. In any case where a candidate's ability to complete and interpret laboratory findings using motor skills is compromised, the candidate must demonstrate alternative means and/or abilities to retrieve these physical findings.
4. **Strength and Mobility:** Candidates and students must demonstrate strength, including lower extremity and body strength, and mobility to complete laboratory dissections or experiments.
5. **Intellectual, Conceptual, Integrative, and Quantitative Abilities:** Candidates and students must have the ability to accurately measure, calculate, reason, analyze, synthesize, problem solve, and think critically. They must also have the ability to participate and learn through a variety of modalities including, but not limited to, classroom instruction, small groups, team and collaborative activities. In addition, candidates and students should be able to comprehend three-dimensional relationships and understand the spatial relationships of structures. Candidates and students must be able to concentrate, timely analyze and interpret data and make decisions within areas in which there is a reasonable amount of visual and auditory distraction.
6. **Behavioral Attributes, Social Skills, and Professional Expectation:** Candidates and students must be able to effectively utilize their intellectual abilities, exercise good judgment, timely complete all

responsibilities attendant to the diagnosis and care of patients, and develop mature, sensitive, and effective relationships with patients and colleagues. Candidates and students must be able to professionally manage heavy workloads, prioritize conflicting demands, and function effectively under stress. They must be able to adapt to changing environments; to display flexibility, to learn to function in the face of their own possible biases and uncertainties inherent in the process of research, and to not engage in substance abuse. Candidates and students must be able to understand and determine the impact of the social determinants of health and other systemic issues which impact the care for all individuals in a respectful and effective manner regardless of perceived race, color, national origin, ethnicity, creed, religion, age, disability, sex, gender, gender identity, sexual orientation, or any other protected status. Professionalism, compassion, integrity, concern for others, interpersonal skills, interest and motivation are all qualities that are required throughout the educational process.

REASONABLE ACCOMMODATIONS

Des Moines University welcomes qualified candidates and students with disabilities who meet the technical standards of the program, with or without reasonable accommodations. Students with a disability who may need accommodations during their educational career at DMU will be asked to reaffirm their need for accommodations when acknowledging the ability to meet technical standards annually.

The student is responsible for requesting accommodations through the Accommodations and Educational Support Specialist in the Center for Educational Enhancement. Please reach out in person, by email (accommodations@dmu.edu), or by calling 515-271-1516. The Accommodations and Educational Support Specialist reviews all requests for accommodations through an individualized, interactive process.

The use of an intermediary may be a reasonable accommodation while performing some non-essential physical maneuvers or non-technical data gathering. However, an intermediary cannot substitute for the candidates' or student's interpretation and judgement. Intermediaries may not perform essential skills on behalf of the candidate or student, nor can they replace technical skills related to selection and observation.

PROCESS FOR ASSESSING COMPLIANCE WITH THE TECHNICAL STANDARDS

Candidates are required to attest at the time they accept an offer to matriculate that they meet the applicable technical standards, with or without reasonable accommodation, and annually confirm they continue to meet these standards. These standards are not intended to deter any candidate or student who might be able to complete the requirements of the curriculum with reasonable accommodations.

The University will provide reasonable accommodations as may be required by the Americans with Disabilities Act or the Iowa Civil Rights Act.

A student whose behavior or performance raises questions concerning his or her ability to fulfill these technical standards may be required to obtain evaluation or testing by a health care provider designated by the University, and to provide the results to the Center for Educational Enhancement to be considered as part of the interactive process to determine possible reasonable accommodations.

Technological compensation can be made with respect to certain technical standards, but candidates and students should be able to perform these standards in a reasonably independent manner.

PHYSICAL HEALTH

In addition to the technical standards set forth, candidates and students must possess the general physical health necessary for performing the duties of a student in the health sciences and a health professional in training without endangering the lives of patients and/or colleagues with whom they might have contact.

REQUIRED COURSES

Code	Title	Credit Hours
BIOC 1112	Biochemistry/Molecular Genetics	4.5
PHYPM 1116	Medical Physiology	PHYPM 1116=6 credit hours; MICR 1103=5 credit hours
or MICR 1103 Microbiology & Immunology		
Students taking PHYPM 1116 (6.0 credits) are required to complete 3.0 credits of PHDBS 3B01; students taking MICR 1103 (5.0 credits) are required to complete 4.0 credits of PHDBS 3B01		
PHYPM 2115	Medical Pharmacology	5.5
MBS 1B03	Responsible Conduct Biomedical Research	1
MBS 1B12	Frontiers in Biomedical Research	2.5
MBS 1B14	Research Compliance & Laboratory Safety	0.5
MBS 1B06	Intro to Biostatistics and Data Analysis	2
MBS 2B05	Scientific Communications	1.5
PHDBS 2B01	Molecule to Medicine I	3
PHDBS 2B02	Molecule to Medicine II	3
PHDBS 2B12	Dissertation Proposal	2
PHDBS 2B21	Sem in Biomed Sci I: Presentation Skills	1
PHDBS 2B22	Sem in Biomed Sci II: Presentat Design	1
PHDBS 2B23	Teaching the Biomedical Sciences	1
PHDBS 2B31	Grant Writing Skills I	1
PHDBS 2B32	Grant Writing Skills II	2
PHDBS 2B40	Data Analysis for Clinical Research	2
PHDBS 3B01	Critical Analysis of Biomedical Research (Students 3-4 complete 3-4 credits total)	
PHDBS 1B01	Research	40
PHDBS 4B10	Dissertation I	1
PHDBS 4B20	Dissertation II	1
PHDBS 4B30	Dissertation III	2
Total Required Credits: 86.5		

The University awards the degree of Doctor of Philosophy in Biomedical Sciences (PhD) upon recommendation of the faculty. The Academic Progress Committee reports annually to the college faculty the names of students that have met requirements for the Doctoral degree. To graduate, a student must:

- Exhibit high standards of professional behavior and receive the graduate faculty's recommendation for graduation.
- Successfully complete all required courses and attain a final cumulative GPA of 3.0 or higher.
- Successfully complete and defend their doctoral dissertation.
- Satisfactorily discharge all financial obligations to the University.
- Make continual research project progress commensurate with successful dissertation completion.
- Complete all graduation requirements, including the graduation clearance process and a Petition to Graduate form. The [Petition to Graduate form](#) can be found on the website.