

# Doctor of Philosophy in Biomedical Sciences

## Admission Requirements

The applicant must meet the School of Graduate Studies' current minimum general admission requirements as published in the graduate catalog.

1. Completion of a four-year Bachelor's degree or equivalent from a recognized college or university as described in the UND Undergraduate and Graduate Academic Catalog. Exceptions must be approved by the Dean of the School of Graduate Studies.
2. Coursework: Admission into the Biomedical Sciences Graduate Program is dependent upon the applicant's demonstration of effective academic skills and appropriate undergraduate training. Ideally, the applicant will have completed the following coursework:

- General Biology with laboratory
- General Chemistry with laboratory
- Organic Chemistry with laboratory
- Physics with laboratory
- Biochemistry or equivalent
- Calculus
- Advanced undergraduate coursework in at least one of the following areas: molecular biology, cell/developmental biology, genetics, neuroscience, biochemistry, microbiology, immunology, anatomy, or physiology.

3. Applicants must have a cumulative undergraduate GPA of at least 3.0/4.0. Applicants with previous graduate education should have a cumulative GPA of 3.5/4.0 in their graduate level course work. The Graduate Record Examination (GRE) is not required however good scores (> 50<sup>th</sup> percentile) can enhance the application.

4. International applicants must satisfy the School of Graduate Studies English Language Proficiency Requirements.

5. A Statement of Goals must be included with the application materials. This statement will describe the student's academic achievements, research experience and accomplishments, career goals, and objectives for applying to the Biomedical Sciences Graduate Program.

6. Three letters of recommendation addressing the student's academic performance and research or professional experience are required to complete the application. At least two letters must be from faculty having direct knowledge of the student's academic capabilities.

7. Preference will be given to students who can demonstrate undergraduate research and/or a record of scholarly publication or other relevant experience.

## Degree Requirements

Students seeking the Ph.D. degree in the Biomedical Sciences Graduate Program must satisfy all general requirements set forth by the School of Graduate Studies as well as particular requirements set forth by the Biomedical Sciences Graduate Program. In addition to course work, the Ph.D. degree requires completion of an acceptable dissertation in a program of study designed by the student with Faculty Advisory Committee approval.

1. A minimum of 90 credit hours of graduate level courses including research and dissertation.

2. Completion of the following graduate level courses:

Code	Title	Credits
BIMD 501	Scientific Discovery I	6
BIMD 502	Scientific Discovery II	6
BIMD 510	Basic Biomedical Statistics (fulfills the scholarly tool requirement)	2

BIMD 516	Responsible Conduct of Research	2
BIMD 518	Grant Writing	2
BIMD 590	Research	at least 50
BIMD 999	Dissertation	6

3. The optional transcriptable subplan (Specialization) in Neuroscience requires completion of the following 5 courses (10 credits):

Code	Title	Credits
BIMD 520	Principles of Neuroanatomy	2
BIMD 521	Neurophysiology	2
BIMD 522	Principles of Neuropharmacology	2
BIMD 523	Neurochemical Basis of the Nervous System	2
BIMD 524	Neurodegenerative Diseases and Pathophysiology	2

4. The optional transcriptable subplan (Specialization) in Microbiology and Immunology requires completion of the following 2 courses (4 credits):

Code	Title	Credits
BIMD 530	Components of the Immune System	2
BIMD 531	Components of Microbial Pathogenesis	2

and also requires completion of 5 credits chosen from the following courses:

Code	Title	Credits
BIMD 532	Microbial Gene Regulation	1
BIMD 533	Microbial Membranes and Transport	1
BIMD 534	Microbial Cell Structure and Function	1
BIMD 535	Bacterial Host: Pathogen Interactions	1
BIMD 536	Molecular Biology and Pathogenesis of Viruses	1
BIMD 537	Host-Pathogen Interactions involving Eukaryotic Microbes (Parasites/Fungi)	1
BIMD 538	Immunological Disorders	1

5. Students who choose not to complete a subplan must complete a minimum of 6 credit hours of graduate level elective courses selected from the following:

Code	Title	Credits
ANAT 513	Gross Anatomy	6
ANAT 521	Principles of Developmental Biology	3
ANAT 522		6
ANAT 591	Special Topics in Anatomy and Cell Biology	1-3
BMB 533	Advanced Topics	1-9
MBIO 501		2
MBIO 504		2
MBIO 508		2
MBIO 509		3
MBIO 512		2
MBIO 515	Advanced Topics	2
MBIO 519		2
PPT 500	Principles of Physiology and Pharmacology	6
PPT 503	Advanced Pharmacology or Physiology	3
PPT 505	Research Techniques	1
PPT 511	Biochemical and Molecular Mechanisms of Pharmacology	3
PPT 512	Special Topics in Pharmacology, Physiology and Therapeutics	2
PPT 525	Advanced Renal Physiology	3
PPT 526	Advanced Respiratory Physiology	3
PPT 527		3
PPT 528	Advanced Endocrinology	3
PPT 529	Adv Cardiovascular Physiology	3

PPT 530	Advanced Neurochemistry	3
PPT 535		3
PPT 540		3
BIMD 520	Principles of Neuroanatomy	2
BIMD 521	Neurophysiology	2
BIMD 522	Principles of Neuropharmacology	2
BIMD 523	Neurochemical Basis of the Nervous System	2
BIMD 524	Neurodegenerative Diseases and Pathophysiology	2
BIMD 530	Components of the Immune System	2
BIMD 531	Components of Microbial Pathogenesis	2
BIMD 532	Microbial Gene Regulation	1
BIMD 533	Microbial Membranes and Transport	1
BIMD 534	Microbial Cell Structure and Function	1
BIMD 535	Bacterial Host: Pathogen Interactions	1
BIMD 536	Molecular Biology and Pathogenesis of Viruses	1
BIMD 537	Host-Pathogen Interactions involving Eukaryotic Microbes (Parasites/Fungi)	1
BIMD 538	Immunological Disorders	1

6. A student must obtain at least a "B" in all required courses in order to remain in good standing in the graduate program. If less than a "B" is received, the student will be given the opportunity to remediate in a manner determined by the course director. If remediation is unsuccessful, the student may petition the Graduate Faculty to take the course a second time. In the event that the student is unable to raise the grade to at least a "B", the student must petition the Graduate Faculty to be allowed to remain in the program.

7. Students must maintain a minimum 3.0 GPA in accordance with School of Graduate Studies guidelines (UND Graduate and Undergraduate Academic Catalog).

8. Students must successfully complete the comprehensive examination.

9. Students must fulfill the teaching requirement as defined by the student's Faculty Advisory Committee in consultation with the Department Chair and the Director of Graduate Studies in Biomedical Sciences.

10. Research and Dissertation: The Ph.D. degree requires completion of a dissertation based on the results of a project completed by the graduate student under the guidance of a faculty advisor. The project must represent an original and independent investigation by the student. It is expected that the student will publish at least one first author peer-reviewed manuscript in a scientific or academic journal prior to the defense of their dissertation. The dissertation prepared by the candidate must be presented orally in a public forum and defended before the Faculty Advisory Committee and the Departmental Graduate Faculty and will be open to all members of the academic community.