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.

4. Graduate Record Examination scores: Applicants must submit Graduate Record Examination scores. The General test is required; the Subject test is strongly recommended. The Biochemistry, Cell and Molecular Biology, Biology, or Chemistry subject tests are acceptable. Preference for admission will be given to applicants whose averaged test scores are at or above the 50th percentile.

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

6. 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.

7. 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.

8. 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:
   - BIMD 501 Scientific Discovery I 6
   - BIMD 502 Scientific Discovery II 6

3. The optional transcriptable subplan (Specialization) in Neuroscience requires completion of the following 5 courses (10 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):
   - 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:
   - 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:
   - ANAT 513 Gross Anatomy 6
   - ANAT 517  3
   - ANAT 521 Principles of Developmental Biology 3
   - ANAT 522 Neuroscience 6
   - ANAT 591 Special Topics in Anatomy and Cell Biology 1-3
   - BMB 533 Advanced Topics 1-9
   - MBIO 501 Molecular Virology 2
   - MBIO 504 Microbial Physiology 2
   - MBIO 508 Microbial Pathogenesis 2
   - MBIO 509 Immunology 3
   - MBIO 512 Microbial Genetics 2
   - MBIO 515 Advanced Topics 2
   - MBIO 519 Advanced Immunology 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 1
   - PPT 525 Advanced Renal Physiology 3
   - PPT 526 Advanced Respiratory Physiology 3
   - PPT 527 Advanced Neurophysiology 3
   - PPT 528 Advanced Endocrinology 3
   - PPT 529 Adv Cardiovascular Physiology 3
   - PPT 530 Advanced Neurochemistry 3
   - PPT 535 Mechanisms of Neurodegenerative Disorders 3
   - PPT 540 Molecular Neuropharmacology 3
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<tr>
<th>Course Code</th>
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<tr>
<td>BIMD 520</td>
<td>Principles of Neuroanatomy</td>
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<td>Neurophysiology</td>
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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 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.