

Biochemistry & Molecular Biology

Doctor of Philosophy

The department of Biochemistry and Molecular Biology offers graduate programs leading to the M.S., Ph.D., and M.D./Ph.D. degrees. All programs are research-oriented and students begin research work during their first year. The Ph.D. program prepares students for a variety of careers including academic teaching and research, as well as research associated careers in various governmental, industrial, and private research laboratories. Research is conducted in the areas of neurochemistry, protein/protein interactions, receptor proteins, signal transduction, and membrane transporter regulation. Adjunct professors at the United States Department of Agriculture Human Nutrition Research Center provide additional research opportunities for students. The Center carries out research to assess nutrient needs for humans with an emphasis on determining mineral requirements that prevent disease and promote health and optimal function throughout life.

Admission Requirements

1. A four-year bachelor's degree from a recognized college or university.
2. Minimally, the applicant successfully will have completed the following coursework:
 - General biology or zoology (one year sequence)
 - General chemistry (one year sequence)
 - Organic chemistry (minimum of 6 semester credits)
3. Courses in calculus, physics, analytical chemistry, cell biology, molecular biology, biochemistry, and genetics are recommended.
4. The general Graduate Record Examination is required.
5. A minimum TOEFL Score of 550 on the paper-based test or 213 on the computer-based test, or for the Internet based TOEFL, a composite score of 79, with minimum scores of 21/30 (Speaking*); 19/30 (Listening); 19/30 (Reading); and 17/30 (Writing) for applicants whose native language is not English. Applicants may also meet language requirements by presenting IELTS scores of 6.5. *Applicants being considered for Graduate Teaching Assistantships must achieve these minimum TOEFL scores, but have a minimum score of 26/30 on the Speaking subtest. A student who has begun the Master of Science Program in Biochemistry and Molecular Biology may transfer into the doctoral program and have work completed incorporated into the doctoral program if approved by the BMB graduate faculty and the Dean of the Graduate School. Students in the master's program who wish to proceed toward the Ph.D. degree without obtaining an M.S. may request permission to do so after they meet the following requirements:
 1. Accumulation of a minimum of 19 graduate credits with a GPA of 3.5 or greater.
 2. Minimum cumulative GPA of 3.0 in BMD 500, 510, 513, 515, 516 and at least one credit of BMB 533.
 3. A minimum of 4 credits of BMB 590.

Degree Requirements

Students seeking the Doctor of Philosophy degree through the Department of Biochemistry and Molecular Biology at the University of North Dakota must satisfy all general requirements set forth by the Graduate School as well as particular requirements set forth by the Department of Biochemistry and Molecular Biology.

1. Performance of original research of a quality suitable for publication in a refereed, professional journal and the preparation of a dissertation based thereon.

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2. A minimum of 90 credit hours, including research and dissertation.
3. At least one-half of the credits must be at or above the 500-level.
4. A maximum of one-fourth (usually eight-to-nine semester credits) of the credit hours required for the degree may be transferred from another institution.
5. A grade of "B" or better in BIMD 500 and an overall GPA of at least 3.0.
6. Passing performance on oral and written comprehensive examinations covering the coursework in the major and related areas.
7. Preparation and oral defense of a satisfactory dissertation.
8. Required Courses as described in the Academic Catalog.

Faculty and Areas of Expertise

- **Gene. A. Homandberg, Ph.D., Chair**, Roles and mechanisms of extracellular matrix degradation products in cartilage degeneration and homeostasis
- **Siegfried Detke, Ph.D., Graduate Program Director**, DNA amplification and drug resistance, membrane anchoring proteins
- **James D. Foster, Ph.D.**, Dopamine transporter phosphorylation, regulation and trafficking; glucose-6-phosphatase system structure/function relationships and regulation
- **Barry I. Milavetz, Ph.D.**, Regulation of chromatin structure, interactions between nuclear factors and enhancer elements
- **Joyce Ohm, Ph.D.**, Role of stem cell pluripotency genes and signaling pathways during the formation of a tumor initiating cell
- **John B. Shabb, Ph.D.**, Regulation of cAMP-dependent protein kinase, protein stability, subcellular localization, phosphorylation and cyclic nucleotide-receptor interaction
- **Brij Singh, Ph.D.**, Characterization of calcium channel proteins, regulation, membrane targeting, structure-function relationship
- **Katherine A. Sukalski, Ph.D., Director of Educational Programs**, Curriculum development and reform, faculty enhancement
- **Roxanne A. Vaughan, Ph.D.**, Structure-function properties of the dopamine transporter – a regulator of dopaminergic neurotransmission and site of action of cocaine and amphetamines
- **Min Wu, Ph.D.**, mechanism of DNA damage and repair in lung oxidation and inflammation

Joint Faculty from the Department of Pathology (Mary Ann Sens, M.D., Ph.D., Chair, Donald Sens, Ph.D., Scott Garrett, Ph.D., Seema Somji, Ph.D.), Role of environmental agents in cancer and resultant biomarkers

Contact Information

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