

# Doctor of Philosophy Biomedical Sciences with a Concentration in Bioinformatics and Genomics (PhD)

Barbara Hargrave, Graduate Program Director

In this interdisciplinary program, students will master a broad range of basic biomedical science topics. Integration of the basic courses is reinforced by a rotation of laboratory experiences and by special seminars that highlight disciplinary interrelationships and approaches to biomedical research. The student progresses from a core of basic courses to in-depth study of specific biomedical problems. This includes advanced doctoral courses and the doctoral research project. Under the guidance of the graduate faculty, the student will integrate knowledge from the broad spectrum of biomedical disciplines into their focus on an area of specialization.

The program graduate will be a scientist with a broad biomedical education and a demonstrated ability to carry out original and creative research, cognizant of disciplinary interfaces and implications and capable of pursuing and/or recommending continuing lines of study. They will be prepared to bridge the gap between practice and discovery in the art of medicine and the practice of science. The graduate is capable of serving in an industrial, governmental, or academic teaching or research setting, either independently or as a member of a team.

## Admission

The requirements for admission to the biomedical sciences Ph.D. program are as follows:

1. A bachelor's degree from an accredited college or university with a B (3.00) average. Students with advanced degrees are encouraged to apply.
2. In addition to the University's English Language Proficiency Requirements, international applicants must have either a score of 84 on the TOEFL, with a score of 26 on the speaking portion, or an IELTS overall score of 8.
3. Prior training in biology (two years), calculus and/or statistics, and organic chemistry (one year). Additional courses in biology, chemistry, and physics are recommended.

## Application Procedures

The completed application for the biomedical sciences Ph.D. program will include the following items:

1. Transcripts of coursework only from institutions awarding a bachelor's or master's degree.
2. A statement of personal goals and academic objectives.
3. Writing sample on a science related topic (from a course or from your research experience).
4. Resume listing all degrees earned and work experience.
5. Three letters of recommendation on letterhead, from faculty members at colleges attended who are familiar with the applicant's academic and research capabilities.
6. A completed application form.
7. Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) test scores, sent directly from ETS to the ODU International Graduate Admissions Office. Test scores must accompany applications for non-native English speaking candidates with a degree issued outside of the United States.

Applications must be completed online at <http://www.odu.edu/admission/graduate> by the deadline posted

on the website. The applicant is responsible for ensuring all application materials are received and the application is complete in all respects.

Students holding a bachelor's degree in another, related field, such as computer science, mathematics, or physics may need to take leveling courses in biological and chemical sciences or pursue master's level work in those fields. The Biological Sciences department and the Chemistry & Biochemistry department both offer master's degrees.

## Financial Support

Sources of financial aid available to biomedical sciences Ph.D. students include:

1. Research and teaching assistantships
2. Students on research or teaching assistantships may be eligible for a tuition waiver.
3. Financial Aid

## Curriculum Requirements

To accomplish the objectives of the program, the student:

1. Enrolls in the basic biomedical sciences courses to develop a broad foundation for more advanced course work and dissertation research;
2. Selects a concentration and completes the required advanced courses. Students choose the concentration with the selection of the mentor, which varies based on how they entered the program;
3. Completes at least 78 credit hours beyond the bachelor's degree or 49 to 50 credit hours beyond the master's degree;
4. Presents two seminars;
5. Candidacy Exam and Prospectus: Develops a written interdisciplinary research NIH style proposal based on preliminary and proposed research that is accepted by the student's committee. Successfully presents and passes an oral exam on the grant proposal and on coursework. The proposal must provide evidence of original and independent thinking.
6. Develops an interdisciplinary research proposal in NIH format that is accepted by the guidance committee;
7. Performs publishable research to demonstrate the ability to complete original and creative research projects; and
8. Prepares and successfully defends a dissertation.

## Biomedical Sciences Core

Core Courses		
BIOL 810	Advanced Cell Biology	3
BIOL 847	Responsible Conduct of Research	2
BIOL 857	Biometry	4
BMS 899	Dissertation Research	6
CHEM 865	Advanced Biochemistry	3
HLSC 873	Planning Proposals and Developing Grants in Health Research	3
MDTS 850	Molecular Genetics, Gene Function and Genomics	3
<b>Concentration Credits</b>		<b>13-14</b>
<b>Required Research Credits</b>		<b>12</b>
BMS 898	Doctoral Research	
<b>Total Credit Hours</b>		<b>49-50</b>

## Bioinformatics and Genomics Concentration

CS 823	Introduction to Bioinformatics	3
Select two of the following:		6
BDA 640	Genomic Data Science	
BIOL 801	Practical Computing for Biology	
BIOL 803	Advanced Genomics Data Analysis	

CHEM 881	Protein Bioinformatics and Functional Genomics	
CS 895	Topics in Computer Science	
MDTS 820	Genomic Databases: Content, Curation, and Application to Biomedical Research	
<b>Graduate Seminars</b>		<b>4</b>
BIOL 890	Biomedical Doctoral Seminar *	
<b>Total Credit Hours</b>		<b>13</b>

\* Two graded seminar courses required.

## Electives

Optional elective courses require permission of dissertation committee.

## Additional Requirements

### Continuance

Students must maintain a 3.0 GPA and receive no more than one course grade of B- or lower to continue in the Ph.D. program. Students are also required to complete Responsible Conduct of Research training within their first 12 completed credit hours in the program.

### Teaching

Students are required to successfully complete the GTAI Institute and teach at least one semester. International students or students where English is not their first language are required to either pass the SPEAK test or demonstrate they have received a score of 26 or better on the speaking portion of their iBT TOEFL exam.

## Exit Requirements

Students must complete the following in order to graduate:

1. Academic requirements - All core and concentration course requirements
2. Publication Research
3. Exit Survey