

# DOCTOR OF PHILOSOPHY IN MOLECULAR BIOLOGY

**Web Site:** <https://twu.edu/biology/graduate-programs/doctor-of-philosophy-in-molecular-biology/>

The Doctor of Philosophy degree in Molecular Biology is offered through a cooperative program of the Federation of North Texas Area Universities that includes Texas Woman’s University and the University of North Texas. Within this degree option, courses are available on a variety of topics in molecular biology and neurobiology.

The Federation doctoral program provides opportunities for formal course work, seminars, independent study, participation in regional and national conferences, and dissertation research. The program also includes Federation-sponsored seminars featuring outstanding nationally and internationally recognized educators.

Graduate students enrolled at either UNT or TWU may take courses at both universities, thus benefiting from the combined faculties of each school. Students graduating from a Federation program will be granted a Ph.D. from the university through which they entered the program.

Students in the Ph.D. program at TWU complete the required coursework, a written proposal (the prospectus) outlining their research plans, and then conduct original research under the guidance of a faculty mentor and an advisory committee. The results of the research are prepared as a written dissertation and presented in a public seminar. The student must pass an oral examination (dissertation defense) administered by the advisory committee following the public seminar in order to earn the doctoral degree. Students who complete this program are well-prepared for careers in academia, industry, or the government sector.

## Marketable Skills

Defined by the Texas Higher Education Coordinating Board’s 60x30 Strategic Plan (<https://reportcenter.highered.texas.gov/agency-publication/miscellaneous/the60x30-strategic-plan/>) as, “Those skills valued by employers that can be applied in a variety of work settings, including interpersonal, cognitive, and applied skills areas. These skills can be either primary or complementary to a major and are acquired by students through education, including curricular, co-curricular, and extracurricular activities.”

1. Demonstrate critical thinking by using logic and reasoning to interpret scientific results, evaluate primary literature, and identify alternative explanations for given results.
2. Conceive, design, and perform properly controlled experiments for testing a hypothesis using modern scientific instruments and methods.
3. Work collaboratively as part of a team to perform, analyze, and present scientific results and research outcomes.
4. Demonstrate leadership on scientific projects and the ability to supervise others in coordinated group efforts.
5. Understand research regulations and comply with all laboratory safety guidelines.

## Admissions

All students must meet the University requirements as outlined in the Admission to the TWU Graduate School (<https://catalog.twu.edu/>

graduate/graduate-school/admission-graduate-school/) section of the catalog.

The academic program may have additional admission criteria that must also be completed as outlined on the program’s website.

## Degree Requirements

### Total Semester Credit Hours Required

A minimum of 90 semester credit hours including those at the master’s level and 6 semester credit hours for dissertation.

Code	Title	SCHs
<b>To be fulfilled by every Ph.D. student as early as possible in the program</b>		
BIOL 6513	Molecular Biology	3
BIOL 6334	Advanced Cell Biology	4
BIOL 6734	Advanced Genetics	4
CHEM 5613	Advanced Biochemistry I	3
BIOL 5611	Readings in Biology (taken 3 times)	3
BIOL 5681	Seminar (taken 3 times)	3
Research Tools 1		6-8
Research Tools 2		6
Electives		38-52
<b>To complete the program</b>		<b>6-18</b>
BIOL 6983	Dissertation (may take twice)	
BIOL 6993	Dissertation (may take 4 times)	

## Research Tools

Students must show proficiency in two Research Tools and may select from categories such as Research Methods, Scientific Communication, or Statistics. Other options, such as Bioinformatics, Business, or Grant writing, may be available with approval from the Graduate Advisor and advisory committee.

Code	Title	SCHs
<b>Research Methods</b>		
BACT 6534	Plasmids as Vectors for Recombinant DNA	
BACT 6544	Viruses as Vectors for Recombinant DNA	
<b>Scientific Communication</b>		
BIOL 5123	Biostatistics	
BIOL 5293	Advanced Scientific Communication	
<b>Statistics</b>		
MATH 5573	Statistical Methods I	
MATH 5583	Statistical Methods II	

## Electives

In addition to the required courses, students may choose elective courses which may include, but are not limited to:

Code	Title	SCHs
BIOL 5033	Advanced Science in the Secondary Classroom	3
BIOL 5293	Advanced Scientific Communication	3
BIOL 5333	Advanced Pathophysiology	3
BIOL 5643	Neuroscience	3
BIOL 5663	Biology of Cancer	3

BIOL 5503	Research Methods	3
BIOL 5611	Readings in Biology	1
BIOL 5613	Readings in Biology	3
BIOL 5801	Biological Research	1
BIOL 5803	Biological Research	3
BIOL 5881	Biological Research	1
BIOL 5883	Biological Research	3
BIOL 5901	Special Topics (*)	1
BIOL 5903	Special Topics (*)	3
BIOL 5911	Independent Study	1
BIOL 5913	Independent Study	3
BIOL 5973	Professional Paper	3
BIOL 6843	Health Care Genetics	3
BIOL 6821	Research in Molecular Biology	1
BIOL 6823	Research in Molecular Biology	3
BIOL 6831	Research in Molecular Biology	1
BIOL 6833	Research in Molecular Biology	3
BIOL 6911	Independent Study	1
BIOL 6913	Independent Study	3
CHEM 5623	Advanced Biochemistry II	3

\*Special Topics courses cover emerging issues or specialized content not represented in the main curriculum. Past special topics have included: Bioinformatics, Cancer Biology, Electron Microscopy, Genetics, Genome Editing, Immunology, Neuroscience, and Signal Transduction.

## Dissertation

6 to 18 dissertation hours

## Qualifying Examination

The qualifying examination consists of two parts: a written research proposal (the Prospectus); and an oral examination covering the contents of the proposal as well as general knowledge in the fields of molecular biology. The student must complete all required coursework and research tools prior to the Qualifying examination. The student's advisory committee administers the examination.

## Final Examination

A public seminar in which the student shares the research results followed by an oral examination by the advisory committee are required.