

BIOLOGY, PH.D.

Doctoral studies in biology at Saint Louis University emphasize intensive research training under the direction of a member of the graduate faculty. Once a biology Ph.D. student at SLU successfully completes required coursework and the written and oral qualifying examinations, he or she is expected to design and conduct an original research project and to work independently.

The student will be required to present his or her work at local and/or national professional meetings and may also be expected to seek external funding to support the research project. Ideally, the student's research will result in publication in peer-reviewed scientific journals. A minimum of 36 credits are required, with at least 24 credits of coursework and 12 credits of dissertation research.

Curriculum Overview

SLU's Ph.D. in biology requires a minimum of 36 post-baccalaureate credits, with at least 24 credits of coursework and 12 credits of dissertation research.

Careers

Past biology Ph.D. students at SLU have gone on to careers as research scientists, teachers, university faculty, and in various capacities in pharmaceutical companies and government agencies.

Admission Requirements

Suggested courses include: biology (a minimum of eighteen, upper-division credits); chemistry (a minimum of eight, upper-division credits including two semesters of organic chemistry or one semester of organic chemistry and the other of biochemistry); physics (two semesters); mathematics (through a course in calculus). A formal minor is not permitted.

For students interested in ecology, evolution or systematics, additional coursework in some of the following areas is also recommended: genetics, general ecology, evolution, introductory statistics, general botany, and a taxonomically oriented course. For students interested in Cell or Molecular Biology, additional coursework in some of the following areas is recommended: genetics, biochemistry, cell biology, physiology, molecular biology, microbiology or immunology.

Previous laboratory and research experience preferred.

Application Requirements

- Application form and fee
- Three letters of recommendation
- GRE or MCAT
- Transcript(s)
- Résumé
- Goal statement
- Interview (desired)

Requirements for International Students

All admission policies and requirements for domestic students apply to international students along with the following:

- Demonstrate English Language Proficiency (<http://catalog.slu.edu/academic-policies/office-admission/undergraduate/english-language-proficiency>)
- Proof of financial support must include:
 - A letter of financial support from the person(s) or sponsoring agency funding the time at Saint Louis University
 - A letter from the sponsor's bank verifying that the funds are available and will be so for the duration of study at the University
- Academic records, in English translation, of students who have undertaken postsecondary studies outside the United States must include the courses taken and/or lectures attended, practical laboratory work, the maximum and minimum grades attainable, the grades earned or the results of all end-of-term examinations, and any honors or degrees received. WES and ECE transcripts are accepted.

Assistantship Application Deadline

Students who want to be considered for an assistantship must submit their application by Dec. 15.

Review Process

Faculty committee members examine each applicant's materials and make recommendations. Consideration is given for matching applicant interests with faculty research areas.

Applicants should outline their research goals in their professional goals statement and should identify and correspond with faculty members whose area of research matches their interests early in the application process.

Scholarships, Assistantships and Financial Aid

For priority consideration for graduate assistantship, applicants should complete their applications by the program admission deadlines listed. Fellowships and assistantships provide a stipend and may include health insurance and a tuition scholarship for the duration of the award.

For more information, visit the student financial services office online at <http://www.slu.edu/financial-aid>.

Learning Outcomes

1. Graduates will be able to critically analyze primary literature articles by evaluating the scientific contributions of peer-reviewed publications in biology.
2. Graduates will be able to effectively communicate scientific ideas.
3. Graduates will be able to demonstrate professional integrity.
4. Graduates will be able to use appropriate instrumentation and analytical methods to collect data.
5. Graduates will be able to draw statistically valid conclusions from quantitative data.
6. Graduates will be able to design novel research that advances knowledge of their field.
7. Graduates will be able to conduct self-directed research.

Requirements

The program for the Doctor of Philosophy in Biology degree requires a minimum of 36 credits, when pursued from the baccalaureate, including 24 credits of structured coursework and 12 credits of dissertation research. Courses may be chosen from upper-level electives within

the Department of Biology or related departments; coursework may be tailored to the research interests in consultation with the advisory committees of students.

The following requirements govern which courses may be counted toward a degree:

- At least **20** credits of structured courses (these do not include BIOL 6970 Research Topics and/or BIOL 6980 Graduate Reading Course)
- At least **14** credits (*exclusive of dissertation*) must be 5000- and 6000-level courses
- At least **12** credits (*exclusive of dissertation*) of the total program must be from the Biology Department
- No more than **4** credits of BIOL 6970 Research Topics and/or BIOL 6980 Graduate Reading Course
- 12 credits exactly of BIOL 6990 Dissertation Research; **however, students may not register for BIOL 6990 Dissertation Research until they have advanced to candidacy**
- Students must be enrolled in a course (even if it is for 0 credits) every fall and spring semester to maintain standing in the program; students on 11-month assistantships must also enroll during the summer.

Code	Title	Credits
Required Courses		
BIOL 5800	Research Colloquium (taken for 0 credits in the student's first year, 1 credit in the student's second year)	1
BIOL 5860	Scientific Communication Practicum	1
Dissertation Research		12
BIOL 6990	Dissertation Research (taken over multiple semesters)	
Seminars		
BIOL 6810	Departmental Seminar (must be taken each semester enrolled)	0
Take two semesters of the following:		
BIOL 5820	Graduate Seminar in Cell and Molecular Regulation (two semesters total; may be taken for 1-2 credits)	2-4
or BIOL 5840	Graduate Seminar in Ecology, Evolution and Systematics	
Elective Courses		
<i>Elective Courses (p. 2)</i>		18-20
Total Credits		36

Elective Courses

Code	Title	Credits
BIOL 4020	Vertebrate Reproductive Physiology	3
BIOL 4040	Pollination Biology	3
BIOL 4090	Plant Ecology	3
BIOL 4100	Natural History of Vertebrates	4
BIOL 4110	Natural History	1
BIOL 4120	Field Botany	5
BIOL 4130	Field Mammalogy	5
BIOL 4140	Field Ornithology	5
BIOL 4150	Nerve Cell Mechanisms in Behavior	3
BIOL 4160	Microbial Ecology and Molecular Evolution	4

BIOL 4200	Aquatic Ecology	4
BIOL 4210	Biology and Classification of Orchids	3
BIOL 4260	Biology of Amphibians and Reptiles	4
BIOL 4280	Biology of Fishes	4
BIOL 4310	Biology of Birds	1-4
BIOL 4320	Cave Biology	4
BIOL 4330	Spring Flora of the Ozarks	4
BIOL 4340	Systematic Biology	3
BIOL 4350	Biology of Parasitic Organisms	4
BIOL 4360	Animal Behavior	3
BIOL 4370	Animal Behavior Lab	1
BIOL 4380	Biology of Mammals	4
BIOL 4400	Applied Ecology	3
BIOL 4410	Comparative Animal Physiology	3
BIOL 4440	Vertebrate Histology: Structure and Function of Tissues	4
BIOL 4480	Conservation Biology	3
BIOL 4500	Introductory Endocrinology	3
BIOL 4510	Behavioral Endocrinology	3
BIOL 4540	Human Systemic Physiology	3
BIOL 4610	Developmental Biology Lab	2
BIOL 4640	General Microbiology	3
BIOL 4650	General Microbiology Laboratory	2
BIOL 4720	Cancer Biology	3
BIOL 4910	Internship in Conservation	1-6
BIOL 4912	Internship in Plant Science	1-3
BIOL 5000	Problems in Vertebrate Morphology	2-5
BIOL 5010	Ecology of Vertebrate Reproduction	3
BIOL 5020	Comparative Vertebrate Reproduction	3
BIOL 5030	Genomics	3
BIOL 5050	Molecular Techniques Lab	2
BIOL 5070	Advanced Biological Chemistry	3
BIOL 5080	Advanced Cell Biology	3
BIOL 5090	Biometry	4
BIOL 5100	Cellular and Molecular Genetic	3
BIOL 5120	Signal Transduction	3
BIOL 5170	Intro to GIS	3
BIOL 5180	Intermediate GIS	3
BIOL 5190	Geographic Information Systems in Biology	3
BIOL 5300	Problems in Vertebrate Physiology	2-4
BIOL 5340	Problems in Cell Biology	1-2
BIOL 5350	Current Topics in Cell Biology	2
BIOL 5400	Problems in Genetics	1-4
BIOL 5410	Ecological Genetics	3
BIOL 5420	Problems in Evolutionary Biology	1-4
BIOL 5450	Biogeography	3
BIOL 5480	Conservation Biology	3
BIOL 5500	Problems in Ecology	2-4
BIOL 5550	Advanced Ecology	3
BIOL 5560	Advanced Evolution	3
BIOL 5580	Applied Population Genetics	3
BIOL 5610	Principles of Develop Biology	3

BIOL 5630	Concepts of Immunobiology	3
BIOL 5640	Advanced Microbiology	3
BIOL 5670	Advanced Population Biology	3
BIOL 5700	Advanced Molecular Biology	3
BIOL 5760	Problems in Botany	3
BIOL 5780	Molecular Phylogenetic Analysis	3
BIOL 5820	Graduate Seminar in Cell and Molecular Regulation	1-2
BIOL 5840	Graduate Seminar in Ecology, Evolution and Systematics	2
BIOL 6040	Current Topics in Developmental Biology	3
BIOL 6150	Neural Basis of Behavior	3
BIOL 6300	Special Studies: Comparative Physiology	1-4

Non-Course Requirements

New Ph.D. degree students who enter the program with a B.S. or B.A. degree may take the written preliminary exam the first or second spring semester they are in the program. New Ph.D. students who enter the program with a Master's degree are required to take the written preliminary exam the first spring semester they are at SLU.

All doctoral students must pass Written and Oral exams to advance to candidacy; these are typically attempted at the end of the second and third semesters, respectively. All doctoral students must also complete one year of teaching. This can be accomplished by serving as a Graduate Teaching Assistant, by completing two semesters of a Practicum in Teaching course, or by other teaching experience approved by the student's Committee and the Department Chair.

Continuation Standards

Students must maintain a cumulative grade point average (GPA) of 3.00 in all graduate/professional courses.

Roadmap

Roadmaps are recommended semester-by-semester plans of study for programs and assume full-time enrollment unless otherwise noted.

Courses and milestones designated as critical (marked with !) must be completed in the semester listed to ensure a timely graduation. Transfer credit may change the roadmap.

This roadmap should not be used in the place of regular academic advising appointments. All students are encouraged to meet with their advisor/mentor each semester. Requirements, course availability and sequencing are subject to change.

General Schedule

Course	Title	Credits
Year One		
Fall		
4000/5000 level electives ¹		5-6
BIOL 5800	Research Colloquium	0
BIOL 6810	Departmental Seminar	0
	Credits	5-6
Spring		
Completion of Written Exams in May		
4000/5000 level electives		3

BIOL 5820 or BIOL 5840	Graduate Seminar in Cell and Molecular Regulation or Graduate Seminar in Ecology, Evolution and Systematics	1-2
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BIOL 5860	Scientific Communication Practicum	1
BIOL 6810	Departmental Seminar	0
	Credits	5-6

Summer		
BIOL 6970	Research Topics	1
	Credits	1

Year Two		
Fall		
Completion of Oral Exams		
4000/5000 level electives		4-3
BIOL 6810	Departmental Seminar	0
BIOL 5800	Research Colloquium	1
	Credits	5-4

Spring		
4000/5000 level electives		3-2
BIOL 5820 or BIOL 5840	Graduate Seminar in Cell and Molecular Regulation or Graduate Seminar in Ecology, Evolution and Systematics	2-1
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research	1
	Credits	6-4

Summer		
BIOL 6990	Dissertation Research	2
	Credits	2

Year Three		
Fall		
4000/5000 level electives		2-3
BIOL 6990	Dissertation Research	1
BIOL 6810	Departmental Seminar	0
	Credits	3-4

Spring		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research	1
	Credits	1

Summer		
BIOL 6990	Dissertation Research	2
	Credits	2

Year Four		
Fall		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research	1
	Credits	1

Spring		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research	1
	Credits	1

Summer		
BIOL 6990	Dissertation Research	1
	Credits	1
Year Five		
Fall		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research	1
	Credits	1
Spring		
BIOL 6810	Departmental Seminar	1
BIOL 6990	Dissertation Research	1
	Credits	2
	Total Credits	36

¹ A maximum of 6 hours of 4000-level courses can count toward the PhD.

Sample Schedule for a student whose focus is Cell/ Molecular Biology

Course	Title	Credits
Year One		
Fall		
BIOL 5050	Molecular Techniques Lab	2
BIOL 5700	Advanced Molecular Biology	3
BIOL 5800	Research Colloquium	0
BIOL 6810	Departmental Seminar	0
	Credits	5
Spring		
BIOL 5070	Advanced Biological Chemistry	3
BIOL 5820	Graduate Seminar in Cell and Molecular Regulation	2
BIOL 5860	Scientific Communication Practicum	1
BIOL 6810	Departmental Seminar	0
	Credits	6
Summer		
BIOL 6970	Research Topics	1
	Credits	1
Year Two		
Fall		
BIOL 5030	Genomics	3
BIOL 5640	Advanced Microbiology	3
BIOL 5800	Research Colloquium	1
BIOL 6810	Departmental Seminar	0
	Credits	7
Spring		
BIOL 5630	Concepts of Immunobiology	3
BIOL 5820	Graduate Seminar in Cell and Molecular Regulation	2
BIOL 6990	Dissertation Research ¹	1
BIOL 6810	Departmental Seminar	0
	Credits	6

Summer		
BIOL 6990	Dissertation Research ¹	2
	Credits	2
Year Three		
Fall		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Spring		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Summer		
BIOL 6990	Dissertation Research ¹	2
	Credits	2
Year Four		
Fall		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Spring		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Summer		
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Year Five		
Fall		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Spring		
BIOL 6810	Departmental Seminar	1
BIOL 6990	Dissertation Research ¹	1
	Credits	2
	Total Credits	37

¹ After second year, students should register for Dissertation Research (BIOL 6990 Dissertation Research (0-6 cr)), 1-3 credits/semester, until 12 credits are reached. After 12 credits have been reached, students should register for 0 hrs of BIOL 6990 Dissertation Research (0-6 cr) each semester until they graduate.

Sample Schedule for a student whose focus is Ecology/ Evolutionary Biology

Course	Title	Credits
Year One		
Fall		
BIOL 5550	Advanced Ecology	3
BIOL 5030	Genomics	3
BIOL 5800	Research Colloquium	0

BIOL 6810	Departmental Seminar	0
	Credits	6
Spring		
BIOL 5480	Conservation Biology	3
BIOL 5840	Graduate Seminar in Ecology, Evolution and Systematics	2
BIOL 5860	Scientific Communication Practicum	1
BIOL 6810	Departmental Seminar	0
	Credits	6
Summer		
BIOL 6970	Research Topics	1
	Credits	1
Year Two		
Fall		
BIOL 5560	Advanced Evolution	3
BIOL 5640	Advanced Microbiology	3
BIOL 5800	Research Colloquium	1
BIOL 6810	Departmental Seminar	0
	Credits	7
Spring		
BIOL 5840	Graduate Seminar in Ecology, Evolution and Systematics	2
BIOL 5450	Biogeography	3
BIOL 6990	Dissertation Research ¹	1
BIOL 5810	Department Seminar	0
	Credits	6
Summer		
BIOL 6990	Dissertation Research ¹	2
	Credits	2
Year Three		
Fall		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Spring		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Summer		
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Year Four		
Fall		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Spring		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research ¹	1
	Credits	1

Summer		
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Year Five		
Fall		
BIOL 6810	Departmental Seminar	0
BIOL 6990	Dissertation Research ¹	1
	Credits	1
Spring		
BIOL 6810	Departmental Seminar	1
BIOL 6990	Dissertation Research	1
	Credits	2
	Total Credits	37

¹ After second year, students should register for Dissertation Research (BIOL 6990 Dissertation Research), 1-3 credits/semester, until 12 credits are reached. After 12 credits have been reached, students should register for 0 credits of Dissertation Research (BIOL 6990) each semester until they graduate.