BIOLOGY WITH MOLECULAR BIOLOGY EMPHASIS (BS)

Recent advances in genetics, molecular biology, and related biotechnologies have created a strong demand for college graduates with training in these areas. Hands-on experience in the use of the latest molecular techniques is particularly important to this training.

The BS in Biology with Molecular Biology emphasis program is designed for students seeking a rigorous, laboratory-intensive curriculum to prepare them for health-related professions, research jobs, or graduate programs in a number of areas related to molecular biology. The curriculum includes the same foundational lecture and laboratory courses in the areas of cell biology, genetics, and ecology taken by general Biology majors. Additional coursework focuses specifically on topics related to molecular biology.

Curriculum

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This specialized Biology major requires 37 credit hours including 9 required Biology courses (21 credit hours) and Biology elective courses (16 credit hours) plus cognate courses in Calculus, Chemistry and Physics. This track allows students to receive the strong background in fundamental biology required of all Biology majors, while also specializing in the area of molecular biology. Students will follow the program outlined below.

Code	Title	Hours	
Biology Courses:	Required		
BIOL 101	General Biology I	3	
BIOL 111	General Biology I Lab	1	
BIOL 102	General Biology II	3	
BIOL 112	General Biology II Lab	1	
BIOL 251	Cell Biology	3	
BIOL 265	Ecology	3	
BIOL 282	Genetics	3	
BIOL 283	Genetics Laboratory	1	
BIOL 366	Cell Physiology & Biochemistry	3	
Biology Courses: Electives			
Select one of the	following:	3	
BIOL 382	Molecular Genetics		
BIOL 387	Genomics		
BIOL 388	Bioinformatics		
Select one of the	following:	1-4	
BIOL 366L	Cell Physiology & Biochemistry Lab		
BIOL 390	Molecular Biology Laboratory		
BIOL 396	Research ^{1,2}		
BIOL 398	Internship in Biology ^{1,2}		
Select 9-12 credit	hours of the following:	9-12	
BIOL 252	Cell Biology Laboratory		
BIOL 296	Introduction to Research ¹		
BIOL 302	General Microbiology Lec/Lab		
BIOL 307	Biology of Stem Cells		
BIOL 315	Introductory Immunology Lec/Lab		
BIOL 317	Models of Human Disease		
BIOL 318	General Virology		

	BIOL 319	Evolution	
	BIOL 344	Microbial Evolution and Human Well-being	
	BIOL 351	Sleep/Circadian Rhythms	
	BIOL 352	Neurobiology of Feeding in Health and Disease	
	BIOL 366L	Cell Physiology & Biochemistry Lab ³	
	BIOL 376	Seminar in Molecular/Cellular Neuroscience	
	BIOL 377	Molecular Pathogenesis	
	BIOL 380	Genetics and Evolution of Development	
	BIOL 381	Epigenetics	
	BIOL 382	Molecular Genetics ³	
	BIOL 383	Population Genetics	
	BIOL 384	Microbial Pathogenesis of Infectious Disease	
	BIOL 387	Genomics ³	
	BIOL 388	Bioinformatics ³	
	BIOL 390	Molecular Biology Laboratory ³	
	BIOL 392	Metagenomics	
	BIOL 395	Special Topics in Biology ¹	
	BIOL 395L	Special Topics Laboratory ¹	
	BIOL 396	Research ^{1,2,3}	
	BIOL 398	Internship in Biology (Capstone Course) ^{1,2,3}	
	BIOL 399	Individual Study ¹	
	PHYS 371	Biophysics	
Cł	nemistry		
Cł	HEM 160	Chemical Structure and Properties	3
	or CHEM 101	General Chemistry A Lecture/Discussion	
	or CHEM 105	Chemical Principles	
Cł	HEM 161	Chemical Structure and Properties Laboratory	1
	or CHEM 105	Chemical Principles	
	or CHEM 111	General Chemistry Lab A	
Cł	HEM 180	Chemical Reactivity I	3
	or CHEM 221	Organic Chemistry I Lec/Disc	
	or CHEM 223	Organic Chemistry A Lec/Disc	
Cł	HEM 181	Chemical Reactivity I Lab	1
	or CHEM 221	Organic Chemistry I Lec/Disc	
	or CHEM 225	Organic Chemistry Lab A	
Cł	HEM 240	Chemical Reactivity II	3
	or CHEM 222	Organic Chemistry II Lec/Disc	
	or CHEM 224	Organic Chemistry B Lec/Disc	
Cł	HEM 241	Chemical Reactivity II Laboratory	1
	or CHEM 222	Organic Chemistry II Lec/Disc	
	or CHEM 226	Organic Chemistry Lab B	
Cł	HEM 260	Quantitative Methods in Chemistry	3
	or CHEM 102	General Chemistry B Lecture/Discussion	
	or CHEM 106	Basic Inorganic Chemistry	
Cł	HEM 261	Quantitative Methods in Chemistry Laboratory	1
	or CHEM 106	Basic Inorganic Chemistry	
	or CHEM 112	General Chemistry Lab B	
м	athematics	•	
М	ATH 131	Applied Calculus I	3-4
	or MATH 161	Calculus I	
M	ATH 132	Applied Calculus II	3-4
	or MATH 162	Calculus II	

Physics

Total Hours		67
PHYS 112L	College Physics Lab II	1
or PHYS 126	General Physics II Lec/Dis	
or PHYS 122	College Physics II with Calculus Lecture/Discussion	
PHYS 112	College Physics II Lec/Disc	3
PHYS 111L	College Physics Laboratory I	1
or PHYS 125	General Physics I Lec/Dis	
or PHYS 121	College Physics I with Calculus Lecture/Discussion	
PHYS 111	College Physics I Lec / Dis	3

¹ Topics must be molecular and approved by the Biology Department.

² Either BIOL 396 Research OR BIOL 398 Internship in Biology (but NOT both) count as Biology Electives.

³ If not taken to fulfill another requirement.

Suggested Course Sequence

The below sequence of courses is meant to be used as a suggested path for completing coursework. An individual student's completion of requirements depends on course offerings in a given term as well as the start term for a major or graduate study. Students should consult their advisor for assistance with course selection.

The biology department recommends that students pursuing the BS in Biology with Molecular Biology Emphasis complete their required classes in the following sequence. Requirements include courses in Biology (BIOL), Chemistry (CHEM), Mathematics (MATH) and Physics (PHYS):

Course	Title	Hours
First Semester		
BIOL 101	General Biology I	3
BIOL 111	General Biology I Lab	1
CHEM 160	Chemical Structure and Properties	3
CHEM 161	Chemical Structure and Properties Laboratory	1
MATH 131	Applied Calculus I	3
	Hours	11
Second Semester		
BIOL 102	General Biology II	3
BIOL 112	General Biology II Lab	1
CHEM 180	Chemical Reactivity I	3
CHEM 181	Chemical Reactivity I Lab	1
MATH 132	Applied Calculus II	3
	Hours	11
Third Semester		
BIOL 282	Genetics	3
BIOL 283	Genetics Laboratory	1
CHEM 240	Chemical Reactivity II	3
CHEM 241	Chemical Reactivity II Laboratory	1
	Hours	8
Fourth Semester		
BIOL 251	Cell Biology	3
or BIOL 265	or Ecology	
CHEM 260	Quantitative Methods in Chemistry	3

CHEM 261	Quantitative Methods in Chemistry Laboratory	1
	Hours	7
Fifth Semester		
BIOL 265 or BIOL 251	Ecology or Cell Biology	3
PHYS 111	College Physics I Lec / Dis	3
PHYS 111L	College Physics Laboratory I	1
	Hours	7
Sixth Semester		
BIOL 366	Cell Physiology & Biochemistry	3
BIOL 382 or BIOL 387 or BIOL 388	Molecular Genetics or Genomics or Bioinformatics	3
PHYS 112	College Physics II Lec/Disc	3
PHYS 112L	College Physics Lab II	1
	Hours	10
Seventh Semester		
Select one of the f	ollowing:	1-4
BIOL 366L	Cell Physiology & Biochemistry Lab	
BIOL 390	Molecular Biology Laboratory	
BIOL 396	Research	
BIOL 398	Internship in Biology	
BIOL Elective Mole	ecular	3-6
	Hours	7
Eighth Semester		
BIOL Elective Mole	ecular	3
BIOL Elective Mole	ecular	3
	Hours	6
	Total Hours	67

TRANSFERRING CREDIT

Transfer students seeking the BS in Biology with Molecular Biology Emphasis degree must take a minimum of 20 credit hours in Biology courses at Loyola. No more than 18 credit hours from another institution may be applied to the BS in Biology with Molecular Biology Emphasis degree program.

COURSE REPEAT RULE

Effective with the spring 2009 semester, students are allowed only TWO attempts to pass Biology courses with a C- or better grade. The two attempts includes withdrawals (W).

The procedure for securing approval for a repeat: Students must come to the Biology Department, fill out a permission to register form, and obtain signatures of both the faculty instructor, and the Biology Chairperson or Assistant-Chairperson. A copy of this form is then submitted to the student's academic advisor to secure final permission for the repeat. After a second attempt to pass a Biology course, it is at the discretion of the Biology Chairperson or Assistant-Chairperson whether the student may repeat the course.

College of Arts and Sciences Graduation Requirements

All Undergraduate students in the College of Arts and Sciences are required to take two Writing Intensive courses (6 credit hours) as well as complete a foreign language requirement at 102-level or higher (3 credit hours) or a language competency test. More information can be found here (https://www.luc.edu/cas/college-requirements/).

Additional Undergraduate Graduation Requirements

All Undergraduate students are required to complete the University Core, at least one Engaged Learning course, and UNIV 101. SCPS students are not required to take UNIV 101. Nursing students in the Accelerated BSN program are not required to take core or UNIV 101. You can find more information in the University Requirements (https://catalog.luc.edu/undergraduate/university-requirements/) area.

At the completion of the Undergraduate Biology with Molecular Biology Emphasis Major:

- 1. Students will demonstrate developing mastery of the following Vision and Change core concepts and their related principals as they relate to the central dogma of molecular biology and how it impacts cellular and organismal processes: evolution (the diversity of lifeforms that have evolved over time through mutations, selection and genetic change; structure and function (the basic units of biological structures that define the functions of all living things); information flow, exchange and storage (the influence of genetics on the control of the growth and behavior of organisms); pathways and transformations of energy and matter (the ways in which chemical transformation pathways and the laws of thermodynamics govern the growth and change of biological systems); and systems (the ways in which living things are interconnected and interact with one another).
- 2. Students will be able to retrieve, synthesize, and critically evaluate scientific literature.
- 3. Students will be able to communicate (orally and in writing) results and interpretation of scientific research.
- Students will be able to design and implement experiments that test predictive hypotheses, analyze data, report results, and interpret the significance of these experiments to enhance their understanding of molecular biology.