

# BIOLOGY/SECONDARY EDUCATION (BS/MED)

Become a high school biology teacher. In this five-year, dual-degree program, students earn a bachelor's degree in Biology and a master's degree in Secondary Education, preparing them to teach grades 9-12. Through this program, students qualify for an Illinois Professional Educator License (PEL) in Secondary Education (grades 9-12) and fulfill the requirements for the Illinois English as Second Language (ESL) endorsement. Additional endorsements can be added to teach science in Middle Grades (grades 5-8), as well as additional science disciplines.

In Illinois there is a critical need for secondary science teachers. Numerous job opportunities are available for students interested in becoming secondary science teachers.

- Earn both degrees together in less time and at a lower cost than it would take if pursued separately.
- Gain broad perspective through a multidisciplinary curriculum.
- Get real-world classroom experience in diverse settings through Loyola partnerships with schools and communities.
- Gain extensive experiences engaging with diverse populations, including students with special needs and those labeled as English language learners (ELL).

## CURRICULUM

Students are enrolled in the College of Arts and Sciences (<https://www.luc.edu/cas/>) for the first four years, working to complete the requirements for a bachelor of science degree in biology. Students may begin the required sequence of classes for the MEd in Secondary Education starting in their junior or senior year. The remainder of required education courses, including student teaching, are completed in the fifth year.

Code	Title	Hours
<b>Biology BS Requirements</b>		
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
Choose one of the following:		1
BIOL 252	Cell Biology Laboratory	
BIOL 266	Ecology Laboratory	
BIOL 283	Genetics Laboratory	
<i>Biology Courses: Electives</i>		
At least two (2) elective courses must include a laboratory component and at least nine (9) credits must be at 300-level.		19
<i>Chemistry</i>		
CHEM 160	Chemical Structure and Properties	3
or CHEM 101	General Chemistry A Lecture/Discussion	
or CHEM 105	Chemical Principles	
CHEM 161	Chemical Structure and Properties Laboratory	1
or CHEM 105	Chemical Principles	

or CHEM 111	General Chemistry Lab A	
CHEM 180	Chemical Reactivity I	3
or CHEM 221	Organic Chemistry I Lec/Disc	
or CHEM 225	Organic Chemistry Lab A	
CHEM 181	Chemical Reactivity I Lab	1
or CHEM 221	Organic Chemistry I Lec/Disc	
or CHEM 225	Organic Chemistry Lab A	
CHEM 240	Chemical Reactivity II	3
or CHEM 222	Organic Chemistry II Lec/Disc	
or CHEM 224	Organic Chemistry B Lec/Disc	
CHEM 241	Chemical Reactivity II Laboratory	1
or CHEM 222	Organic Chemistry II Lec/Disc	
or CHEM 226	Organic Chemistry Lab B	
CHEM 260	Quantitative Methods in Chemistry	3
or CHEM 102	General Chemistry B Lecture/Discussion	
or CHEM 106	Basic Inorganic Chemistry	
CHEM 261	Quantitative Methods in Chemistry Laboratory	1
or CHEM 106	Basic Inorganic Chemistry	
or CHEM 112	General Chemistry Lab B	
<i>Mathematics</i>		
MATH 131	Applied Calculus I	3-4
or MATH 161	Calculus I	
MATH 132	Applied Calculus II	3-4
or MATH 162	Calculus II	
<i>Physics</i>		
PHYS 111	College Physics I Lec / Dis	3
or PHYS 121	College Physics I Lec/Dis	
or PHYS 125	General Physics I Lec/Dis	
PHYS 111L	College Physics Laboratory I	1
PHYS 112	College Physics II Lec/Disc	3
or PHYS 122	College Physics II Lec/Dis	
or PHYS 126	General Physics II Lec/Dis	
PHYS 112L	College Physics Lab II	1
<b>Secondary Education MEd Requirements</b>		
TLSC 401	Language, Learning & Development Theories in Practice	2
TLSC 403	Teaching for Social Justice and Equity	3
TLSC 404	Constructive Learning Environments for Diverse Students	3
TLSC 406	Educational Policy for Diverse Students	3
TLSC 407	Individualized Assessment and Instruction for Diverse Students	3
TLSC 443	Adolescent Literacy Instruction	3
TLSC 455	Secondary Content Methods: Curriculum, Instruction and Assessment in Secondary Content Areas	6
TLSC 460	Developing Rigorous and Relevant Instruction and Assessment	2
TLSC 461	Designing and Implementing Rigorous and Relevant Instruction	3
TLSC 470A	Student Teaching for Change	4
TLSC 470B	Student Teaching for Change	4

TLSC 480	Teaching for Change Field Seminar	1
<b>Total Hours</b>		<b>104</b>

Students work under the guidance of the School of Education Senior Academic Advisor to outline a specific course of study to fulfill all requirements. The number and timing of the education courses taken in the fourth and fifth years can vary depending on each student's particular needs. Summer courses may be needed between the fourth and fifth year depending on the number of courses taken during years three and four, and depending on whether additional teaching endorsements are sought.

## Biology Electives

Code	Title	Hours
<b>Biology</b>		
Any BIOL 200-Level Course		1
Any BIOL 300-Level Course		
BIOL 2TRN Biology 200-Level Transfer		
BIOL 3TRN Biology 300-Level Transfer		
<b>Anthropology</b>		
ANTH 280 / BIOL 280	Evolution of Human Disease	3
ANTH 281 / BIOL 281	Evolution of the Human Diet	3
ANTH 325 / BIOL 325	Primatology-Behavior & Ecology	3
ANTH 326 / BIOL 326	Human Osteology Lec/Lab	4
ANTH 327 / BIOL 378	Dental Anthropology	3
ANTH 346 / BIOL 346	Biology of Women	3
ANTH 359 / BIOL 359	Paleopathology	3
ANTH 360	Issues in Archaeology	3
<b>Chemistry</b>		
CHEM 361 / BIOL 366	Principles of Biochemistry	3
<b>Bioinformatics</b>		
COMP 381 / BIOL 388	Bioinformatics	3
<b>Environmental Science</b>		
ENVS 215 / BIOL 215	Ornithology	3
ENVS 267 / BIOL 347	Bird Conservation and Ecology	3
ENVS 319 / BIOL 329	Winter Ecology	3
ENVS 340 / BIOL 340	Natural History of Belize	3
ENVS 345 / BIOL 349	Conservation and Sustainability of Neotropical Ecosystems	3
ENVS 369 / BIOL 348	Field Ornithology	3
<b>Forensics</b>		
FRSC 371 / BIOL 391	Forensic Molecular Biology Lecture and Laboratory	5

<b>Neuroscience</b>		
NEUR 101	Introduction to Neuroscience <sup>2</sup>	3
NEUR 300 / BIOL 303	Seminar in Neuroscience	1
NEUR 301 / BIOL 373	Laboratory in Neuroscience I	4
NEUR 302	Laboratory in Neuroscience II	3
<b>Physics</b>		
PHYS 371	Biophysics	3
<b>Psychology</b>		
PSYC 240 / BIOL 240	Psychology-Biology of Perception <sup>2</sup>	3
PSYC 311 / BIOL 313	Lab in Psychobiology	3
PSYC 382 / BIOL 284	Behavioral and Cognitive Neuroscience	3
PSYC 388 / BIOL 373	Laboratory in Neuroscience I	4
<b>Statistics</b>		
STAT 310 / BIOL 310	Categorical Data Analysis	3
STAT 335 / BIOL 335	Introduction to Biostatistics	3
STAT 336 / BIOL 336	Advanced Biostatistics	3
STAT 337 / BIOL 337	Quantitative Methods in Bioinformatics	3

<sup>1</sup> If not already taken as a 200-level required course.

<sup>2</sup> Either BIOL 240/PSYC 240 Psychology-Biology of Perception OR NEUR 101 Introduction to Neuroscience (but NOT both) count as Biology Electives.

## Lab Requirements

Code	Title	Hours
<b>100-Level Labs</b>		
Both of the following courses are required:		
BIOL 111	General Biology I Lab	1
BIOL 112	General Biology II Lab	1
<b>200-Level Labs</b>		
Choose one of the following courses:		
BIOL 252	Cell Biology Laboratory	
BIOL 266	Ecology Laboratory	
BIOL 283	Genetics Laboratory	
<b>Biology Elective Labs</b>		
Choose at least two of the following courses:		
BIOL 205	Plant Biology Lec/Lab	4
BIOL 210	Laboratory Techniques	2
BIOL 242	Human Structure and Function I	4
BIOL 243	Human Structure and Function II	4
BIOL 252	Cell Biology Laboratory <sup>1</sup>	1
BIOL 266	Ecology Laboratory <sup>1</sup>	1
BIOL 283	Genetics Laboratory <sup>1</sup>	1
BIOL 302	General Microbiology Lec/Lab	4

BIOL 313	Lab in Psychobiology	3
BIOL 315	Introductory Immunology Lec/Lab	4
BIOL 316	Limnology Lec/Lab	4
BIOL 323	Comparative Anatomy Lec/Lab	4
BIOL 326	Human Osteology Lec/Lab	4
BIOL 327	Wetland Ecology	4
BIOL 340	Natural History of Belize	3
BIOL 341	Histology Lec/Lab	4
BIOL 342	Human Anatomy	4
BIOL 350	Vertebrate Physiology Lec/Lab	4
BIOL 355	Parasitology Lec/Lab	4
BIOL 360	Field Biology	3
BIOL 363	Entomology Lec/Lab	4
BIOL 366L	Cell Physiology & Biochemistry Lab	2
BIOL 367	Bioimaging	4
BIOL 368	Plant Ecology Lec/Lab	4
BIOL 370	Ichthyology Lec/Lab	4
BIOL 373	Laboratory in Neuroscience I	4
BIOL 375	Aquatic Insects Lecture & Laboratory	4
BIOL 385	Prin Electron Microscopy Lec/Lab	4
BIOL 390	Molecular Biology Laboratory	4
BIOL 391	Forensic Molecular Biology Lecture and Lab	5
BIOL 395	Special Topics in Biology (if designated as a laboratory course)	3
BIOL 395L	Special Topics Laboratory	1-4
BIOL 396	Research <sup>2</sup>	3
BIOL 398	Internship in Biology <sup>2</sup>	1-3
ANTH 326	Human Osteology Lec/Lab	4
ENVS 340	Natural History of Belize	3
ENVS 345	Conservation and Sustainability of Neotropical Ecosystems	3
ENVS 398	Special Topics (Topic: Bird Conservation & Ecology)	3
FRSC 371	Forensic Molecular Biology Lecture and Laboratory	5
NEUR 301	Laboratory in Neuroscience I	4
NEUR 302	Laboratory in Neuroscience II	3
PSYC 311	Lab in Psychobiology	3
PSYC 388	Laboratory in Neuroscience I	4

<sup>1</sup> If not already taken as the 200-level required lab.

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

## Suggested Sequence of Courses

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

Course	Title	Hours
<b>Year 1</b>		
<b>Fall</b>		
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
<b>Hours</b>		<b>11</b>

### Spring

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
<b>Hours</b>		<b>11</b>

### Year 2

#### Fall

CHEM 240	Chemical Reactivity II	3
CHEM 241	Chemical Reactivity II Laboratory	1

Select one of the following:

BIOL 251	Cell Biology	
BIOL 265	Ecology	
BIOL 282	Genetics	

Select one of the following:

BIOL 252	Cell Biology Laboratory	1
BIOL 266	Ecology Laboratory	1
BIOL 283	Genetics Laboratory	
<b>Hours</b>		<b>9</b>

#### Spring

CHEM 260	Quantitative Methods in Chemistry	3
CHEM 261	Quantitative Methods in Chemistry Laboratory	1

Select one of the following:

BIOL 251	Cell Biology	
BIOL 265	Ecology	
BIOL 282	Genetics	

**Hours** 7

### Year 3

#### Fall

Select one of the following:

BIOL 251	Cell Biology	
BIOL 265	Ecology	
BIOL 282	Genetics	

PHYS 111	College Physics I Lec / Dis	3
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PHYS 111L	College Physics Laboratory I	1
<b>Hours</b>		<b>4</b>

#### Spring

BIOL Elective		4
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PHYS 112	College Physics II Lec/Disc	3
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PHYS 112L	College Physics Lab II	1
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TLSC 401	Language, Learning & Development Theories in Practice <sup>1</sup>	2
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TLSC 403	Teaching for Social Justice and Equity <sup>1</sup>	3
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TLSC 404	Constructive Learning Environments for Diverse Students <sup>1</sup>	3
<b>Hours</b>		<b>16</b>
<b>Year 4</b>		
<b>Fall</b>		
BIOL Elective		3
BIOL Elective		3
TLSC 406	Educational Policy for Diverse Students <sup>1</sup>	3
TLSC 407	Individualized Assessment and Instruction for Diverse Students <sup>1</sup>	3
TLSC 480	Teaching for Change Field Seminar <sup>1</sup>	1
<b>Hours</b>		<b>13</b>
<b>Spring</b>		
BIOL Elective		3
BIOL Elective		3
<b>Hours</b>		<b>6</b>
<b>Year 5</b>		
<b>Fall</b>		
TLSC 443	Adolescent Literacy Instruction	3
TLSC 455	Secondary Content Methods: Curriculum, Instruction and Assessment in Secondary Content Areas	6
<b>Hours</b>		<b>9</b>
<b>Spring</b>		
TLSC 460	Developing Rigorous and Relevant Instruction and Assessment	2
TLSC 461	Designing and Implementing Rigorous and Relevant Instruction	3
TLSC 470A	Student Teaching for Change	4
<b>Hours</b>		<b>9</b>
<b>Summer</b>		
TLSC 470B	Student Teaching for Change	4
<b>Hours</b>		<b>4</b>
<b>Total Hours</b>		<b>99</b>

May apply to dual-degree program starting in Year 1

Apply to dual-degree program if have not already done so

**Optional - Join a Professional Learning Community (PLC) in the School of Education as schedule allows**

Begin education coursework as schedule allows

**Optional - Join a Professional Learning Community (PLC) in the School of Education as schedule allows**

## Guidelines for Accelerated Bachelor's/ Master's Programs

### Terms

- **Accelerated Bachelor's/Master's programs:** In this type of program, students share limited credits between their undergraduate and graduate degrees to facilitate completion of both degrees.
- **Shared credits:** Graduate level credit hours taken during the undergraduate program and then applied towards graduate program requirements will be referred to as Shared credits.

### Admission Requirements

Accelerated Bachelor's/Master's programs are designed to enhance opportunities for advanced training for Loyola's undergraduates. Admission to these programs must be competitive and will depend upon a positive review of credentials by the program's admissions committee. Accordingly, the admission requirements for these programs may be higher than those required if the master's degree were pursued entirely after the receipt of a bachelor's degree. That is, programs may choose to have more stringent admissions requirements in addition to those minimal requirements below.

### Requirements:

- Declared appropriate undergraduate major,
- By the time students begin taking graduate courses as an undergraduate, the student has completed approximately 90 credit hours, or the credit hours required in a program that is accredited by a specialty organization,<sup>1</sup>
- A minimum cumulative GPA for coursework at Loyola that is at or above the program-specific requirements, a minimum major GPA that is at or above the program-specific requirements, and/or appropriate designated coursework for evaluation of student readiness in their discipline.<sup>2</sup>

Students not eligible for the Accelerated Bachelor's/Master's program (e.g., students who have not declared the appropriate undergraduate major) may apply to the master's program through the regular admissions process. Students enrolled in an Accelerated Bachelor's/Master's

<sup>1</sup> If this TLSC course is not taken in this term, it can be taken in Year 5 Summer term.

## Program Overview

### 5-Year Dual-Degree B.S./M.Ed. Program

Years 1-2	Years 3-4	Year 5 Summer 1	Fall	Spring	Summer 2
Content-area B.A./ B.S. major requirements in CAS	Content-area B.A./ B.S. major requirements in CAS	(Summer courses may be required, depending on what courses were taken in Years 3-4)	Education coursework	Student Teaching	Student Teaching ends in June
Contact School of Education advising	Contact School of Education advising	<b>Optional - Complete additional coursework for endorsements (e.g., bilingual, other content areas)</b>	School visits 1 day per week + on-campus courses 3 late afternoons and evenings per week	Part time student teaching starting in January, full time starting in March	

program who choose not to continue to the master's degree program upon completion of the bachelor's degree will face no consequences.<sup>3</sup>

Ideally, a student will apply for admission (or confirm interest in proceeding towards the graduate degree in opt-out programs) as they approach 90 credit hours. Programs are encouraged to begin advising students early in their major so that they are aware of the program and, if interested, can complete their bachelor's degree requirements in a way that facilitates completion of the program. Once admitted as an undergraduate, Program Directors should ensure that students are enrolled using the plan code associated with the Accelerated Bachelor's/Master's program. Using the plan code associated with the Accelerated Bachelor's/Master's program will ensure that students may be easily identified as they move through the program. Students will not officially matriculate into the master's degree program and be labeled as a graduate student by the university, with accompanying changes to tuition and Financial Aid (see below), until the undergraduate degree has been awarded. Once admitted to the graduate program, students must meet the academic standing requirements of their graduate program as they complete the program curriculum.

<sup>1</sup> Programs that have specialized accreditation will adhere to the admissions criteria provided by, or approved by, their specialized accreditors.

<sup>2</sup> The program will identify appropriate indicators of student readiness for graduate coursework (e.g., high-level performance in 300 level courses). Recognizing differences between how majors are designed, we do not specify a blanket requirement.

<sup>3</sup> If students choose not to enroll in the Accelerated Bachelor's/Master's program, they still must complete all of the standard requirements associated with the undergraduate degree (e.g., a capstone).

## Curriculum

*Level and progression of courses.* The Accelerated Bachelor's/Master's programs are designed to be competitive and attractive to our most capable students. Students admitted to Accelerated Bachelor's/Master's programs should be capable of meeting graduate level learning outcomes. Following guidance from the Higher Learning Commission, only courses taken at the 400 level or higher (including 300/400 level courses taken at the 400 level) will count toward the graduate program.<sup>1,2</sup>

Up to 50% of the total graduate level credit hours, required in the graduate program, may come from 300/400 level courses where the student is enrolled in the 400 level of the course. Further, at least 50% of the credit hours for the graduate program must come from courses that are designed for and restricted to graduate students who have been admitted to a graduate program at Loyola (e.g., enrolled in plan code that indicates the Accelerated Bachelor's/Master's program, typically ending with the letter "D").<sup>3</sup>

In general, graduate level coursework should not be taken prior to admission into the Accelerated Bachelor's/Master's program. Exceptions may be granted for professional programs where curriculum for the Accelerated Bachelor's/Master's program is designed to begin earlier. On the recommendation of the program's Graduate Director, students may take one of their graduate level courses before they are admitted to the Accelerated Bachelor's/Master's program if they have advanced abilities in their discipline and course offerings warrant such an exception.<sup>4</sup>

Undergraduate degree requirements outside of the major are in no way impacted by admission to an Accelerated Bachelor's/Master's program.<sup>5</sup>

*Shared credits.* Undergraduate courses (i.e., courses offered at the 300 level or below) cannot be counted as shared credits nor count towards

the master's degree. Up to 50% of the total graduate level credit hours, required in the graduate program, may be counted in meeting both the undergraduate and graduate degree requirements. Of those shared credits, students in an Accelerated Bachelor's/Master's program should begin their graduate program with the standard introductory course(s) for the program whenever possible. So that students may progress through the Accelerated Bachelor's/Master's program in a timely manner, undergraduate programs are encouraged to design their curriculum such that a student can complete some required graduate credit hours while completing the undergraduate degree. For instance, some of the graduate curriculum should also satisfy electives for the undergraduate major.

The program's Graduate Director will designate credit hours to be shared through the advising form and master's degree conferral review process. Shared credit hours will not be marked on the undergraduate record as having a special status in the undergraduate program. They will be included in the student's undergraduate earned hours and GPA. Graduate credit hours taken during the undergraduate program will not be included in the graduate GPA calculation.

<sup>1</sup> If students wish to transfer credits from another university to Loyola University Chicago, the program's Graduate director will review the relevant syllabus(es) to determine whether it meets the criteria for a 400 level course or higher.

<sup>2</sup> Programs with specialized accreditation requirements that allow programs to offer graduate curriculum to undergraduate students will conform to those specialized accreditation requirements.

<sup>3</sup> In rare cases, the Graduate Director may authorize enrollment in a 400-level course for a highly qualified and highly motivated undergraduate, ensuring that the undergraduate's exceptional participation in the graduate class will not diminish in any way the experience of the graduate students regularly enrolled.

<sup>4</sup> For example, if a particular course is only offered once every 2-3 years, and a student has demonstrated the necessary ability to be successful, the Graduate Director may allow a student to take a graduate level course to be shared prior to the student being formally admitted to the graduate program. See, also, footnote 4.

<sup>5</sup> Students should not, for example, attempt to negotiate themselves out of a writing intensive requirement on the basis of admission to a graduate program.

## Graduation

Degrees are awarded sequentially. All details of undergraduate commencement are handled in the ordinary way as for all students in the School/College/Institute. Once in the graduate program, students abide by the graduation deadlines set forth by the graduate program. Students in these programs must be continuously enrolled from undergraduate to graduate degree program unless given explicit permission by their program for a gap year or approved leave of absence.

## LEARNING OUTCOMES

Students in this program:

- critically evaluate current bodies of knowledge in their field.
- apply culturally responsive practices that engage diverse communities.
- demonstrate knowledge of ethics and social justice.
- hold high expectations and build on the assets of diverse students
- use research and evidence-based practices to design and implement instruction to meet the individual needs of students

- apply deep understanding of both content and pedagogy to provide developmentally appropriate instruction to all students