BIOLOGY/BUSINESS (BS/MBA)

With contemporary life sciences playing an ever-larger role in the economy, there is an increasing demand by employers for individuals with rigorous training in biology as well as business. Career opportunities in the biotechnology and pharmaceutical industries are expanding significantly, and are likely to continue to do so for the foreseeable future as applications of modern biological research continue to grow.

The BS in Biology/MBA dual-degree program provides the type of broad training that contemporary employers in these industries value. It is the first program of its type in the Chicago area.

Related Programs

Major

- Biology (BS) (https://catalog.luc.edu/undergraduate/arts-sciences/biology/biology-bs/)

Minor

- Biology Minor (https://catalog.luc.edu/undergraduate/arts-sciences/biology/biology-minor/)

Curriculum

Program Requirements

Students will complete all the normal requirements for the BS in Biology (https://catalog.luc.edu/undergraduate/arts-sciences/biology/biology-bs/). The MBA program is an 18-course program.

Code	Title	Hours
BS Requirements		
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 335	Intro to Biostatistics	3
Select one of the following:		1
BIOL 252	Cell Biology Laboratory	
BIOL 266	Ecology Laboratory	
BIOL 283	Genetics Laboratory	
Biology Courses: Electives (p. 2)		*16*
At least nine (9) credits must be at 300-level and at least two (2) elective courses must include a laboratory component. (p. 2)		
Chemistry		
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 223	Organic Chemistry A Lec/Disc	
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	
Mathematics		
MATH 131	Applied Calculus I	3-4
or MATH 161	Calculus I	
MATH 132	Applied Calculus II	3-4
or MATH 162	Calculus II	
Physics		
PHYS 111	College Physics I Lec / Dis	3
or PHYS 121	College Physics I with Calculus Lecture/Discussion	
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 with Calculus Lecture/Discussion	
or PHYS 126	General Physics II Lec/Dis	
PHYS 112L	College Physics Lab II	1
Economics		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
MBA Requirements		
MBA Prerequisite Courses		
ISSCM 400N	Quantitative Methods I [1,2]	0
ISSCM 402N	Quantitative Methods II - Statistics Primer [2,3]	0
MBA Introductory Courses		
ACCT 400	Financial Accounting for Business Decisions	3
MARK 460	Marketing Management	3
ECON 420	Managerial Economics [4]	3
FINC 450	Financial Management	3
SCMG 480	Intro to Operations Management	3
MBA Curriculum		
MARK 425N	Business Communication	1.5
MGMT 426N	Leadership Development	1.5
MARK 470N	Research, Insights and Storytelling	3
FINC 470N	Business Finance	3
ISSCM 596N	Data Driven Decision Making	3
ETHC 441N	Business Ethics	3
or MGMT 446	International Business Ethics	
HRER 417N	Managing and Motivating in the Workplace	3

MGMT 430N	Strategy and Leadership	3
MGMT 431N	Business Consulting Course	3
Three (3) MBA Electives		9
Total Hours		**121**

1 **Waived from:** ISSCM 400N Quantitative Methods I
If: Student receives grades of B or higher in MATH 131 Applied Calculus I or MATH 161 Calculus I

2 Note: ISSCM 400N and ISSCM 402N are zero credit, pass/fail, online, self-paced courses which can be taken in the first quarter of the MBA degree if necessary.

3 **Waived from:** ISSCM 402N Quantitative Methods II - Statistics Primer
If: Student receives grade of B or higher in BIOL 335 Intro to Biostatistics or STAT 103 Fundamentals of Statistics

4 **Waived from:** ECON 420 Managerial Economics
If: Student receives grades of B or higher in ECON 201 Principles of Microeconomics & ECON 202 Principles of Macroeconomics.
ECON 201 and ECON 202 also fulfill the Societal and Cultural Knowledge and Inquiry requirement of the Core Curriculum (https://catalog.luc.edu/undergraduate/university-requirements/university-core/).

Biology Electives

Code	Title	Hours
Biology		
Any BIOL 200-Level Course [1]		
Any BIOL 300-Level Course		
BIOL 2TRN Biology 200-Level Transfer		
BIOL 3TRN Biology 300-Level Transfer		
Anthropology		
ANTH 246 / BIOL 246	Ancient Human-Animal Interactions	3
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
Chemistry		
CHEM 361 / BIOL 366	Principles of Biochemistry	3
Computer Science		
COMP 381 / BIOL 388	Bioinformatics	3
Environmental Science		
ENVS 215 / BIOL 215	Ornithology	3
ENVS 267 / BIOL 347	Bird Conservation and Ecology	3
ENVS 319 / BIOL 329		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
Neuroscience		
NEUR 101	Introduction to Neuroscience [2]	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
Physics		
PHYS 371	Biophysics	3
Psychology		
PSYC 240 / BIOL 240	Psychology-Biology of Perception [2]	3
PSYC 311 / BIOL 313	Lab in Psychobiology	3
PSYC 382 / BIOL 284	Behavorial and Cognitive Neuroscience	3
PSYC 388 / BIOL 373	Laboratory in Neuroscience I	4
Statistics		
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

1 If not already taken as a 200-level required course.

2 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
100-Level Labs		
Both of the following courses are required:		
BIOL 111	General Biology I Lab	1
BIOL 112	General Biology II Lab	1
200-Level Labs		
Choose one of the following courses:		
BIOL 252	Cell Biology Laboratory	1
BIOL 266	Ecology Laboratory	1
BIOL 283	Genetics Laboratory	1
Biology Elective Labs		

Choose at least two of the following courses:

BIOL 205	Plant Biology Lec/Lab	4
BIOL 210	Laboratory Techniques	2
BIOL 242	Anatomy and Physiology I	4
BIOL 243	Anatomy and Physiology II	4
BIOL 252	Cell Biology Laboratory [1]	1
BIOL 266	Ecology Laboratory [1]	1
BIOL 283	Genetics Laboratory [1]	1
BIOL 302	General Microbiology Lec/Lab	4
BIOL 313 / PSYC 311	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 / ANTH 326	Human Osteology Lec/Lab	4
BIOL 327	Wetland Ecology	4
BIOL 340 / ENVS 340	Natural History of Belize	3
BIOL 341	Histology Lec/Lab	4
BIOL 342	Human Anatomy	4
BIOL 349 / ENVS 345	Conservation and Sustainability of Neotropical Ecosystems	3
BIOL 355	Parasitology Lec/Lab	4
BIOL 360	Field Biology	3
BIOL 363	Entomology Lec/Lab	4
BIOL 366L	Cell Physiology & Biochemistry Lab	3
BIOL 367	Bioimaging	4
BIOL 368	Plant Ecology Lec/Lab	4
BIOL 370	Ichthyology Lec/Lab	4
BIOL 373 / NEUR 301 / PSYC 388	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 395	Special Topics in Biology (if designated as a laboratory course)	3
BIOL 395L	Special Topics Laboratory	1-4
BIOL 396	Research [2]	3
BIOL 398	Internship in Biology [2]	1-3
NEUR 302	Laboratory in Neuroscience II	3

[1] If not already taken as the 200-level required lab.

[2] 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
Year One		
Fall		
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**
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
	Hours	**11**
Year Two		
Fall		
CHEM 240	Chemical Reactivity II	3
CHEM 241	Chemical Reactivity II Laboratory	1
Select one of the following:		3
BIOL 251	Cell Biology	
BIOL 265	Ecology	
BIOL 282	Genetics	
Select one of the following:		1
BIOL 252	Cell Biology Laboratory	
BIOL 266	Ecology Laboratory	
BIOL 283	Genetics Laboratory	
ECON 201	Principles of Microeconomics	3
	Hours	**11**
Spring		
CHEM 260	Quantitative Methods in Chemistry	3
CHEM 261	Quantitative Methods in Chemistry Laboratory	1
Select one of the following:		3
BIOL 265	Ecology	
BIOL 282	Genetics	
BIOL 251	Cell Biology	
ECON 202	Principles of Macroeconomics	3
	Hours	**10**
Year Three		
Fall		
Select one of the following:		3
BIOL 251	Cell Biology	
BIOL 265	Ecology	
BIOL 282	Genetics	
PHYS 111	College Physics I Lec / Dis	3
PHYS 111L	College Physics Laboratory I	1
	Hours	**7**
Spring		
BIOL Elective		4

PHYS 112	College Physics II Lec/Disc	3
PHYS 112L	College Physics Lab II	1
BIOL 335	Intro to Biostatistics	3
	Hours	**11**
Year Four		
Fall		
BIOL Elective		4
BIOL Elective		3
ACCT 400	Financial Accounting for Business Decisions	3
	Hours	**10**
Spring		
BIOL Elective		4
BIOL Elective		4
MARK 460	Marketing Management	3
	Hours	**11**
Year Five		
Students will complete 13 MBA courses in their 5th year with appropriate waivers.		36
	Hours	**36**
	Total Hours	**118**

Course Waivers

Biology majors admitted to the five-year program can take up to three of the required MBA courses listed above during their senior year. The MBA courses are taught in the evening on a quarter system, with the first quarter beginning at approximately the same time as the fall semester.

Course waivers are determined upon admission to the MBA program. Ideally, biology majors will be waived from ISSCM 400 Quantitative Methods, ISSCM 491 and ECON 420 Managerial Economics. Thus, they will take ACCT 400 Financial Accounting for Business Decisions and MARK 460 Marketing Management during their senior year. These graduate courses can be applied as six hours of free electives toward the BS in Biology degree.

Progress Through the Program

In addition to completing the normal requirements for the BS in Biology (https://catalog.luc.edu/undergraduate/arts-sciences/biology/biology-bs/), students planning to enter the MBA program should do the following:

Freshman/Sophomore Years: Arrange their undergraduate course scheduling to preserve six hours of free electives until their senior year. The majority of biology majors have math and foreign language placements upon entrance that already give them the six hours of free electives. Through use of summer school, the remaining students can also readily have the free elective hours by the time they are seniors. During their first two years, students should take ECON 201 Principles of Microeconomics and ECON 202 Principles of Macroeconomics, which will satisfy the social science requirement of the Core Curriculum and allow the student to waive out of ECON 420 Managerial Economics.

Junior Year (2nd semester): Take the GMAT and make formal application to the MBA program. Take BIOL 335 Intro to Biostatistics. Biostatistics, which counts as an upper-level elective in the biology major and allows the student to waive out of ISSCM 491 .

Senior Year: Take ACCT 400 Financial Accounting for Business Decisions and MARK 460 Marketing Management, which will count as free electives toward the BS degree. Complete all requirements for the BS in Biology.

Fifth Year: During the fifth year, students who have followed the above directions will have a total of 13 MBA courses remaining. These courses can be completed full-time at the rate of three or four per quarter (including the summer quarter). Students also have the option to complete the MBA program on a part-time basis (usually one or two courses per quarter).

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,[1]
- 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.[2]

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 program who choose not to continue to the master's degree program upon completion of the bachelor's degree will face no consequences.[3]

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.

[1] Programs that have specialized accreditation will adhere to the admissions criteria provided by, or approved by, their specialized accreditors.
[2] 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.
[3] 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).

For more information on Admissions requirements, visit here (https://gpem.luc.edu/portal/admission/?tab=home).

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.[1,2] 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").[3]

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 Bachelors/Master's program if they have advanced abilities in their discipline and course offerings warrant such an exception.[4] Undergraduate degree requirements outside of the major are in no way impacted by admission to an Accelerated Bachelor's/Master's program.[5]

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.

[1] 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.
[2] Programs with specialized accreditation requirements that allow programs to offer graduate curriculum to undergraduate students will conform to those specialized accreditation requirements.
[3] 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.
[4] 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 3.
[5] 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. In offering the option of an Accelerated Bachelor's/Master's program, the university is making possible the acceleration of a student's graduate degree completion. It should be understood that students may not request deferral of their matriculation into the Master's degree program. If students would like to delay their graduate studies after earning the undergraduate degree, they may apply for admission to the traditional master's degree program. Any application of graduate credit earned while in the undergraduate program is subject to the policies of the graduate degree granting school.

Learning Outcomes

At the completion of the Biology BS / Business MBA program:

- Students will demonstrate developing mastery of the following Vision and Change core concepts and their related principals: evolution (the diversity of life-forms 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).

- Students will be able to retrieve, synthesize, and critically evaluate scientific literature.
- 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.
- Students will learn: Leadership; Strategy; Data-driven decision making; and Communication, teamwork, and ethics.