

Biology

Biology

Professors: Cassia C. Oliveira and David Thomas

Associate Professors: Alexander Beeser and Maryline Jones

Assistant Professor: Eric South

Biology is the study of life in all of its abundance, variety, and complexity. Students in the biology major gain a broad knowledge of biological fact and theory, from the molecular to the ecosystem level. They develop their abilities to observe, analyze, and solve problems involving living systems.

Both Bachelor of Science and Bachelor of Arts degrees are available in biology. The B.S. degree is designed primarily for students interested in the health professions, a graduate degree, or employment in biology related fields.

NOTES

* Students may use BIO 110, CHM 105, CHM 110, MTH 110, PHY 210/211, and PHY 240/241 to satisfy core requirements.

* CHM 105 is not required for students who enter Lyon College with a score of 25 or better on the ACT mathematics section (or equivalent SAT score) and a grade of "C" or better in high school chemistry.

NOTE: To graduate with a Bachelor of Arts or Bachelor of Science degree from Lyon College, students must successfully complete a minimum of 120 semester credit hours comprised of our required Core curriculum (44-48 hours), the requirements of at least one major (credit hours vary per major), and a selection of our Liberal Arts electives. They must also earn at least a 2.00 cumulative grade point average for all work taken at Lyon College and a 2.00 cumulative grade point average in their major, minor, and concentration.

Biology Degrees

Biology Major (BA)

Summary of Requirements for a Major in Biology (BA)

Item #	Title	Credits
BIO 110	Principles of Biology I	4
BIO 112	Principles of Biology II	4
BIO 250	Cell Biology	4
BIO 252	Genetics	4
	BIO 340 or BIO 370	4
	BIO 300 or MTH 360 or PSY 235	3
BIO 495	Senior Evaluation	0
CHM 105	Introduction to Chemistry *	4
CHM 110	General Chemistry I	4
MTH 110	Elementary Functions	3
	Biology Major Electives	18

CORE CURRICULUM

Item #	Title	Credits
	Core Curriculum Requirements (In addition to Major hours)	44-48
	Total Credits	96-100

BIO 340 or BIO 370

Item #	Title	Credits
BIO 340	Ecology	4
BIO 370	Evolution	4

BIO 300 or MTH 360 or PSY 235

Item #	Title	Credits
BIO 300	Biostatistics	3
MTH 360	Probability and Statistics	3
PSY 235	Statistics for the Behavioral Sciences	3

Biology Major Electives

***All science electives must be at least 200-level.**

At least 12 credits must be 300-level or higher; at least 3 courses must have labs.

Biology Electives

Item #	Title	Credits
BIO 205	Biomedical Terminology	1
BIO 220	General Botany	4
BIO 222	General Zoology	4
BIO 260	Human Anatomy and Physiology I	4
BIO 262	Human Anatomy and Physiology II	4
BIO 282	Special Topics	1-4
BIO 290	Introduction to Biological Research	1-4
BIO 310	Health Coaching	1
BIO 311	Health Coaching Practicum	1
BIO 320	Teaching in the Biology Laboratory	1
BIO 330	Medical Cell Biology	4
BIO 340	Ecology	4
BIO 345	Speleology	4
BIO 350	Microbiology	4
BIO 352	Molecular Biology	4
BIO 356	Biochemistry	4
BIO 360	Comparative Physiology	4
BIO 364	Developmental Biology	4
BIO 366	Histology	4
BIO 370	Evolution	4
BIO 375	Exercise Physiology	4
BIO 382	Special Topics in Biology	3-4
BIO 470	Directed Study	1-4
BIO 480	Directed Research	1-4

Chemistry Electives

Item #	Title	Credits
CHM 210	Organic Chemistry I	4
CHM 220	Organic Chemistry II	4
CHM 356	Biochemistry	4

Exercise Science Electives

Item #	Title	Credits
EXS 375	Exercise Physiology	4

Physics Electives

Item #	Title	Credits
	PHY 210/211 or PHY 240/241	4
	PHY 220/221 or PHY 250/251	4

Psychology Electives

Item #	Title	Credits
PSY 318	Biological Psychology	3
PSY 353	Introduction to Evolutionary Psychology	3

Science Electives

Item #	Title	Credits
SCI 282	Special Topics in Science	1-4
SCI 382	Special Topics in Science	1-4

Biology Major (BS)

Summary of Requirements for a Major in Biology Leading to a Bachelor of Science Degree

Item #	Title	Credits
BIO 110	Principles of Biology I	4
BIO 112	Principles of Biology II	4
BIO 250	Cell Biology	4
BIO 252	Genetics	4
	BIO 340 or BIO 370	4
	BIO 300 or MTH 360 or PSY 235	3
BIO 495	Senior Evaluation	0
CHM 105	Introduction to Chemistry *	4
CHM 110	General Chemistry I	4
CHM 120	General Chemistry II	4
CHM 210	Organic Chemistry I	4
MTH 110	Elementary Functions	3
	Physics Electives (4 credits)	4
	Biology Major Electives - BS	18

CORE CURRICULUM

Item #	Title	Credits
	Core Curriculum Requirements (In addition to Major hours)	44-48
	Total Credits	108-112

BIO 340 or BIO 370

Item #	Title	Credits
BIO 340	Ecology	4
BIO 370	Evolution	4

BIO 300 or MTH 360 or PSY 235

Item #	Title	Credits
BIO 300	Biostatistics	3
MTH 360	Probability and Statistics	3
PSY 235	Statistics for the Behavioral Sciences	3

Physics Electives (4 credits)

* Students may use General Physics I or Fundamentals of Physics I to satisfy core requirements.

Item #	Title	Credits
PHY 210	General Physics I	3
PHY 211	General Physics I Laboratory	1
PHY 240	Fundamentals of Physics I	3
PHY 241	Fundamentals of Physics I Laboratory	1

Biology Major Electives - BS

***All science electives must be at least 200-level.**

At least 12 credits must be 300-level or higher; at least 3 courses must have labs.

Biology Electives

Item #	Title	Credits
BIO 205	Biomedical Terminology	1
BIO 220	General Botany	4
BIO 222	General Zoology	4
BIO 260	Human Anatomy and Physiology I	4
BIO 262	Human Anatomy and Physiology II	4
BIO 282	Special Topics	1-4
BIO 290	Introduction to Biological Research	1-4
BIO 310	Health Coaching	1
BIO 311	Health Coaching Practicum	1
BIO 320	Teaching in the Biology Laboratory	1
BIO 330	Medical Cell Biology	4
BIO 340	Ecology	4
BIO 345	Speleology	4
BIO 350	Microbiology	4
BIO 352	Molecular Biology	4
BIO 356	Biochemistry	4
BIO 360	Comparative Physiology	4
BIO 364	Developmental Biology	4
BIO 366	Histology	4
BIO 370	Evolution	4
BIO 375	Exercise Physiology	4
BIO 382	Special Topics in Biology	3-4
BIO 470	Directed Study	1-4
BIO 480	Directed Research	1-4

Chemistry Electives

Item #	Title	Credits
CHM 220	Organic Chemistry II	4
CHM 356	Biochemistry	4

Exercise Science Electives

Item #	Title	Credits
EXS 375	Exercise Physiology	4

Psychology Electives

Item #	Title	Credits
PSY 318	Biological Psychology	3
PSY 353	Introduction to Evolutionary Psychology	3

Science Electives

Item #	Title	Credits
SCI 282	Special Topics in Science	1-4
SCI 382	Special Topics in Science	1-4

Biology Minor

The biology minor is a course of study designed as a second field for students who wish to develop an understanding of the scientific study of living systems and organisms.

NOTES

* Students may use BIO 110, CHM 105 and CHM 110 to satisfy core requirements.

* CHM 105 is not required for students who enter Lyon College with a score of 25 or better on the ACT mathematics section (or equivalent SAT score) and a grade of "C" or better in high school chemistry.

Summary of Requirements for a Minor in Biology

Item #	Title	Credits
BIO 110	Principles of Biology I	4
BIO 112	Principles of Biology II	4
	BIO 250 or BIO 252	4
	Biology Minor Electives (8 credits)	8
CHM 105	Introduction to Chemistry *	4
CHM 110	General Chemistry I	4
	Total Credits	28

BIO 250 or BIO 252

Item #	Title	Credits
BIO 250	Cell Biology	4
BIO 252	Genetics	4

Biology Minor Electives (8 credits)

Two Biology electives (200+ level)

Biology (BIO) Courses

BIO 100: Biology in Context

Study of the basic principles and unifying concepts of biology. Emphasis is placed on how biology increasingly plays a role in our everyday lives. Topics include organization of living matter, metabolism, reproduction, genetics, ecology and evolution. The course consists of both lecture and laboratory components. Cannot be counted toward biology major.

Credits 4

BIO 101: Short Topics in Biology

Study of current topics in biology appropriate for all students. Elective credit. May be taken more than once for credit with permission of instructor.

Credits 1

BIO 105: Principles of Fermentation Sciences

Principles of Fermentation Sciences will cover the fundamental science of the fermentation processes, its history and culture and application to basic food science, microbiology, chemistry, biology and nutrition. Bio105 will introduce concepts relating to the utilization of grapes, grains and hops utilized by the fermentation industry. Students will be exposed to the basic methods and principles behind the fermentation process including production of bread, vegetables, beer, wine and bio-fuels. The course consists of both lecture and laboratory components. **Students must be 21 years of age or older by the first day of class.**

Credits 4

Prerequisites

BIO 100 or BIO 110

BIO 110: Principles of Biology I

Study of the integrated principles of biology with emphasis on molecular and cellular aspects of organisms, genetics, and organismal homeostatic mechanisms. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

MTH 101, MTH 103, or proficiency

BIO 112: Principles of Biology II

Study of the integrated principles of biology with emphasis on the diversity of organisms in the world, their evolution, and their interactions with each other and the environment. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

BIO 110 and MTH 101 or BIO 110 and MTH 103

BIO 182: Special Topics

Study in a specific area of biology not covered by regularly listed courses. Course content and structure will vary according to the interests of the instructor. Lecture, laboratory, and/or fieldwork may be included.

Credits 1-4

Prerequisites

Permission of instructor.

BIO 205: Biomedical Terminology

A detailed introduction to the terminology used in health professions.

Credits 1

BIO 220: General Botany

General Botany is an introduction to the structure and life processes of plants and plant-like organisms (cyanobacteria, algae, fungi, etc.). Subjects include genetics, development, anatomy, physiology, evolution, and distribution. The course includes lecture and laboratory components.

Credits 4

Prerequisites

BIO 112 & CHM 110

BIO 222: General Zoology

General Zoology is an introduction to the structure and life processes of animals and animal-like organisms (protists, slime molds, etc.). Subjects include genetics, development, anatomy, physiology, evolution, and distribution. The course includes lecture and laboratory components.

Credits 4

Prerequisites

BIO 112, CHM 110, or permission of the instructor.

BIO 250: Cell Biology

A detailed introduction to subcellular and cellular structure and physiology, including membrane structure and function, bioenergetics, transport mechanisms, and intercellular communication. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

BIO 110 & CHM 110

BIO 252: Genetics

An examination of the principles of inheritance and the structure, function, and regulation of genetic material in prokaryotes and eukaryotes. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

BIO 110 & CHM 110

BIO 260: Human Anatomy and Physiology I

The course is the first of a two-part sequence in human anatomy and physiology. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

Recommended: CHM 105 or CHM 110

BIO 262: Human Anatomy and Physiology II

The second of a two-part sequence dealing with the structure and function of the human body. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

BIO 260

Recommended: CHM 105 or CHM 110 and BIO 110

BIO 282: Special Topics

Study in a specific area of biology not covered by regularly listed courses. Course content and structure will vary according to the interests of the instructor. Lecture, laboratory, and/or field work may be included. Prerequisite: permission of the instructor.

Credits 1-4

Prerequisites

Permission of instructor.

BIO 290: Introduction to Biological Research

An introduction to research including literature searches, experimental methods, and proper recording and reporting of experimental results. May be repeated for credit.

Credits 1-4

Prerequisites

BIO 110, CHM 110, and permission of instructor.

BIO 300: Biostatistics

Exploration of the analysis of biological data including experimental design, data collection, describing and displaying data, inferential statistics, and interpretation of results. Students will gain proficiency in the use of statistical computing software. Special emphasis is placed on statistical methods utilized in genetics, epidemiology, human health, ecology, and agriculture.

Credits 3

Prerequisites

MTH 110

BIO 110

BIO 304: Methods for Teaching Life Science in the Secondary School

This course is designed to prepare students majoring in biology for teacher licensure in life science at the secondary (7-12) level.

Credits 3

BIO 310: Health Coaching

An introduction to a wide array of topics on healthcare and healthcare systems in preparation for a practicum as a health coach. Topics include but are not limited to diabetes, cardiovascular disease, dementia, organization of healthcare systems, ethical considerations, and strategies for promoting healthy lifestyles. The course is discussion-based and requires active student engagement.

Credits 1

Prerequisites

Junior standing with focus on a career in the healthcare industries (sophomores may petition to register for the class), minimum GPA of 3.0, and permission of instructor.

BIO 311: Health Coaching Practicum

The second in a series of health coaching classes. Students who successfully complete BIO 310 will enter the practicum class directly. Students will be assigned a patient in the Batesville area and assist them in selected aspects of healthcare.

Credits 1

Prerequisites

Completion of BIO 310 with a B or better and permission of instructor.

BIO 320: Teaching in the Biology Laboratory

Upper-level students who plan to attend graduate school, particularly those who intend to teach at the college level, may take this course to obtain teaching experience. Students will teach alongside a faculty member in a laboratory course they have successfully completed at the 100 or 200 level. Students will attend each laboratory section, assist in teaching the lab, give and receive feedback on lectures, and write a teaching philosophy.

Credits 1

BIO 330: Medical Cell Biology

This course will focus on the structure and function of human cells (human cell biology) with particular emphasis on the context of human health and disease. Lectures focus on normal functions at the molecular and cellular level drawn from the primary literature. The lab will include tissue culture and presentations of the primary literature. Topics include molecules, organelles, cells, cell interactions, regulation, signaling, and death. Examples of known monogenic and polygenic disease mechanisms will be discussed. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

BIO 250

BIO 340: Ecology

Ecology is an introduction to the relationships between biota and their environment with emphasis on limiting factors, competition, coevolution, energy flow, and population dynamics. The course includes lecture and laboratory components, and one Saturday field trip will be required.

Credits 4

Prerequisites

BIO 112

CHM 110

MTH 110

BIO 345: Speleology

An introduction to the study of caves. Students will learn about the formation, ecology, evolution, and inhabitants of caves in the Ozarks and elsewhere. The course includes lecture and lab components.

Credits 4

Prerequisites

BIO 112 & CHM 110

BIO 350: Microbiology

Microbiology examines the structure, biochemistry, genetics, and physiology of microorganisms with an emphasis on bacteria. The course includes lecture and laboratory components.

Credits 4

Prerequisites

BIO 250

CHM 110

BIO 352: Molecular Biology

In-depth study of the structure and regulation of prokaryotic and eukaryotic genes with an emphasis on recombinant DNA techniques and applications. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

BIO 252 or permission of instructor.

BIO 356: Biochemistry

Study of the chemical basis of life. The major biomolecules—proteins, carbohydrates, lipids, and nucleic acids—will be discussed with emphasis on their reactions and roles in living cells. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

CHM 220 or permission of instructor. (Same as CHM 356)

BIO 360: Comparative Physiology

Comparative Physiology provides an in-depth study of the physiological systems that maintain homeostasis in animals with emphasis on the design and function of these systems in different animals in response to the environmental pressures they face. The course consists of lecture and laboratory components.

Credits 4

Prerequisites

BIO 250

BIO 364: Developmental Biology

Study of the major processes which lead to the form and function of multicellular organisms. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

BIO 250 and BIO 252, or permission of instructor.

BIO 366: Histology

Study of the microscopic structure and function of animal tissues and organs. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

BIO 250

BIO 370: Evolution

This course provides an in-depth study of patterns and processes of evolutionary change, and how biological diversity is originated and maintained. The course emphasizes how evolutionary principles are the foundation of modern biology and relevant to other disciplines. Topics include mechanisms of evolutionary change, fossil record, microevolution, macroevolution, population genetics, speciation, and human evolution. The course includes lecture and laboratory components.

Credits 4

Prerequisites

BIO 112

Corequisites

BIO 252

BIO 375: Exercise Physiology

This course addresses how the body – at the cellular, tissue, and organ system levels – responds in function and structure to 1) acute exercise stress and 2) chronic physical activity. Aspects of chemistry, biology, and physics are integrated to explain biological events and their sites of occurrence in the human body as they affect exercise and training. Topics include energy systems, neuromuscular concepts as applied to sports, and functions of the cardiovascular and respiratory systems. The course includes lecture and lab components.

(Same as EXS 375)

Credits 4

Prerequisites

EXS 201

BIO 260

CHM 105

BIO 382: Special Topics in Biology

Study in a specific area of biology not covered by regularly listed courses. Course content and structure will vary according to the interests of the instructor. Lecture, laboratory, and field work may be included.

Credits 3-4

Prerequisites

Permission of instructor.

BIO 399: Biology International Studies Course: Variable Topics

Study of varying topics in biology. Includes a two-week Nichols trip. Prerequisites will vary.

Credits 1

BIO 420: Advanced Topics in Biology

Advanced study in a specific area of biology. Course content and structure will vary according to the interests of the instructor. Lecture, laboratory, and field work may be included.

Credits 3-4

Prerequisites

Permission of instructor.

BIO 425: Advanced Biochemistry

In-depth study of selected biochemical reactions and pathways of major biological and physiological significance, including synthesis and breakdown of important biomolecules, cell signaling pathways, and second messengers. The course consists of both lecture and laboratory components.

Credits 4

Prerequisites

CHM 356 or BIO 356 (Same as CHM 425)

BIO 470: Directed Study

Independent study in a specific area of biology under the direction of the faculty.

Credits 1-4

Prerequisites

Permission of instructor.

BIO 480: Directed Research

Independent research in approved areas of biology. Under direction of faculty, the student will define, design and complete an original research project and/or take part in a larger, ongoing research program. This course may be repeated for credit.

Credits 1-4

Prerequisites

BIO 112, CHM 120, BIO 290, Junior standing and permission of instructor.

BIO 495: Senior Evaluation

This course provides graduating seniors the opportunity to assess their knowledge of biology, and to assess the effectiveness of the biology program. Instead of regular class meetings, students will take a comprehensive exam, which will assess five major areas: cell biology, molecular biology & genetics, organismal biology, ecology & evolution, and analytical reasoning. The senior assessment also allows students to provide feedback concerning their individual learning experiences. Senior Evaluation must be taken before spring break of a student's graduating year. The course is graded pass/fail – satisfactory completion of the exam, regardless of score, is required for a passing grade.

Credits 0

Prerequisites

Senior Standing