



BIOLOGY (2021-2022)

BIOLOGY RESEARCH (2021-2022)

Division of Molecular, Life & Health Sciences

Kate Cooper, Ph.D., Chair

The biology program exists within the framework of a liberal arts college, in the fulfillment of its mission, and as such is dedicated to (1) providing access to fundamental concepts of biology for all students and (2) providing access to specialized biological knowledge for majors who rely on this knowledge for their particular career goals. The program also serves as a source of expertise, both research and instructional, for the local community, State of Iowa and beyond, and provides students the opportunity to learn through participation in this service experience. In both instances, this access and service is afforded in a Catholic atmosphere where moral and ethical implications of biological knowledge and earth's stewardship are raised to the students and various public entities.

The biology program offers majors in biology and biological research. The biology major is designed for those students wishing a broad background in biology, but who do not wish to pursue a research orientation; the biological research major is designed for those students wishing research experience. Successful completion of a comprehensive examination given during the senior year is required of all majors.

L.MAT-117: Pre-Calculus Mathematics or equivalent is required for all biological research major and biology major courses numbered 300 or above. The mathematics courses can be completed before or concurrently with the biology courses.

L.BIO-115: Principles of Biology I cannot be fulfilled with transfer credit once a student matriculates at Loras College.

Student Learning Outcomes – Biology Research
1. Articulate scientific results and interpretation effectively in an oral presentation.
2. Write effectively to communicate scientific information.
3. Design valid and appropriate experiments to answer biological questions.
4. Accurately interpret and analyze biological data and statistics.
5. Demonstrate an understanding of the botany of plants.
6. Demonstrate an understanding of rules of genetic inheritance.
7. Describe important molecules and pathways that allow cells to function in tissues.
8. Apply ecological and evolutionary theory to current ecological problems.
9. Compare normal physiological body functions with diseased body functions.

Requirements for the major in Biological Research (B.S.):

The required and supporting courses for the biological research major must be completed with a cumulative 2.000 GPA. At least 12 credits of required biology courses, numbered 240 or above, must be completed at Loras College, including L.BIO-389, L.BIO-

487, and L.BIO-489. It is highly recommended that students minor in chemistry and take L.MAT-150.

Req	Course	Cr's
1	L.BIO-115/L.BIO-115L: Principles of Biology I-ES w/Lab	4
2	L.BIO-116: Principles of Biology II	4
3	L.BIO-240: Plant Biology	4
4	L.BIO-250: Genetics	4
5	L.BIO-277: Biostatistics-QR	3
6	L.BIO-278: Experimental Design	1
7	L.BIO-330: Evolutionary Ecology	4
8	L.BIO-389: Junior Seminar	1
9	L.BIO-489: Senior Seminar	1
10	L.BIO-410: Cell and Molecular Biology	4
11	L.BIO-420: Vertebrate Physiology	4
12	Elective: Any additional L.BIO course except for 400 or 401	3 to 4
13	L.BIO-487: Senior Seminar Research Portfolio-PJ, IN	2
14	L.CHE-111/L.CHE-111L: General Chemistry I w/Lab	4
15	L.CHE-233/L.CHE-233L: Organic Chemistry I w/Lab	4
Select one from Req 16		
16	L.CHE-112/L.CHE-112L: General Chemistry II w/Lab	4
16	L.CHE-245/L.CHE-112L: Quantitative Chemistry w/Lab	4
Select one from Req 17		
17	L.PHY-210: Elements of Physics I-QR	4
17	L.PHY-223: Physics for Scientists and Engineers I-QR	5
55 to 57 total required credits		

Student Learning Outcomes - Biology	
1.	Articulate scientific results and interpretation effectively in an oral presentation.
2.	Write effectively to communicate scientific information.
3.	Design valid and appropriate experiments to answer biological questions.
4.	Accurately interpret and analyze biological data and statistics.
5.	Demonstrate an understanding of the botany of plants.
6.	Demonstrate an understanding of rules of genetic inheritance.
7.	Describe important molecules and pathways that allow cells to function in tissues.
8.	Apply ecological and evolutionary theory to current ecological problems.
9.	Compare normal physiological body functions with diseased body functions.

Requirements for the major in Biology (B.S.):

The required and supporting courses for the biology major must be completed with a cumulative 2.000 GPA. At least 12 credits of required biology courses, numbered 240 or above, must be completed at Loras College, including L.BIO 389, L.BIO 488, and L.BIO 489. It is highly recommended that students minor in chemistry and take L.MAT-150.

Req	Course	Cr's
1	L.BIO-115/L.BIO-115L: Principles of Biology I-ES w/Lab	4
2	L.BIO-116: Principles of Biology II	4
3	L.BIO-240: Plant Biology	4
4	L.BIO-250: Genetics	4
5	L.BIO-277: Biostatistics-QR	3
6	L.BIO-278: Experimental Design	1
7	L.BIO-330: Evolutionary Ecology	4
8	L.BIO-389: Junior Seminar	1
9	L.BIO-489: Senior Seminar	1
10	L.BIO-410: Cell and Molecular Biology	4
11	L.BIO-420: Vertebrate Physiology	4
12	Elective: Any additional L.BIO course except for 400 or 401	3 to 4
13	L.BIO-488: Senior Seminar Portfolio-PJ, IN	2
14	L.CHE-111/L.CHE-111L: General Chemistry I w/Lab	4
15	L.CHE-233/L.CHE-233L: Organic Chemistry I w/Lab	4
Select one from Req 16		
16	L.CHE-112/L.CHE-112L: General Chemistry II w/Lab	4
16	L.CHE-245/L.CHE-112L: Quantitative Chemistry w/Lab	4
Select one from Req 17		
17	L.PHY-210: Elements of Physics I-QR	4
17	L.PHY-223: Physics for Scientists and Engineers I-QR	5
17	L.PHY-230: Modern Physics	3
54 to 57 total required credits		

Requirements for the minor in Biology:

A minor will complete at least 18 credits in biology to include L.BIO-115, L.BIO-115L and L.BIO-116, and remaining credits in biology courses at or above the 200 level. Students intending to major in a related discipline (e.g., biochemistry, neuroscience, kinesiology) may not use 200-level and above biology courses required as part of that major in fulfillment of the biology minor.

Req	Course	Cr's
1	L.BIO-115/L.BIO-115L: Principles of Biology I w/Lab	4
2	L.BIO-116: Principles of Biology II	4
3	Elective: L.BIO-220 or higher (L.BIO-277 or L.BIO-278 - highly recommended)	3 to 4
4	Elective: L.BIO-220 or higher	3 to 4
5	Elective: L.BIO-220 or higher	4
18 to 20 total required credits		

Course requirements for teacher licensure in Biological Science, Grades 7-12:

State of Iowa endorsement for the teaching major follows the basic course requirements of the biology major but with the following core differences: L.BIO-489 will be fulfilled by L.EDU-

490 with the additional requirements that students present their thesis in L.BIO-489 and write a thesis approved by their biology advisor. It is also recommended that students complete L.BIO-220 and L.PHI-349. For professional education courses, refer to the appropriate section listed under Teacher Education.

2021-2022 BIOLOGY COURSES:

L.BIO-100: Population Biology

This course explores both theoretical and practical approaches to understanding populations of resident bird populations during the winter. Students will use mist nets to capture wild birds and will learn to identify, band, and measure common species. Mark-recapture computer models will be used to estimate population sizes and survival probabilities of selected species during this intensive, three-week field project. This course is intended for students with an interest in environmental science or wildlife conservation. 3 credits. January term. Dependent upon staff and demand.

L.BIO-115: Principles of Biology I-ES

This is the first of a two-semester sequence to introduce fundamental principles of biology (designed primarily for science majors). An investigative-inquiry approach is employed with emphases on molecular cell biology, development, and genetics. Three lecture periods per week. Can be taken before or after L.BIO-116. Co-requisite: L.BIO-115L. 4 credits. Each semester.

L.BIO-115L: Principles of Biology I Lab

Co-requisite lab for L.BIO-115. Both must be passed for the ES general education credit. The emphasis is on the scientific method and topics of molecular cell biology and genetics. 1 credit. Each semester.

L.BIO-116: Principles of Biology II

This is the second of a two-semester sequence to introduce fundamental principles of biology (designed primarily for science majors). An investigative-inquiry approach is employed with emphases on evolution, ecology and biodiversity. Three lecture periods and one three-hour laboratory period per week. Can be taken before or after L.BIO-115. 4 credits. Each spring semester.

L.BIO-201: HIV/AIDS: Biological, Social, and Cultural Issues

This in-depth study course offers students a multidisciplinary perspective on HIV/AIDS, presenting an overview of the biological, clinical, historical, social, political, and ethical aspects of the HIV/AIDS epidemic, its impact on both individuals and society as a whole, and how the framing of HIV/AIDS determines how affected persons are treated. Students will gain a fundamental understanding of the basic medical science/etiology and public health aspects of HIV/AIDS. Further, students will generate questions about the disease and learn answers via individual and group research, critical film viewing, dialogue with researchers, doctors, caregivers, patients, survivors, patient advocates, and/or government officials, and potential visits to treatment centers. January term. 3 credits.

L.BIO-205: Diabetes, Heart Disease, & Cancer

This in-depth study course will address one of these major diseases each week. Students will generate questions about each disease and learn answers via research, visits to treatment centers and dialogue with researchers, doctors, caregivers, insurance experts, patient advocates and government officials. The course will be an investigative inquiry-driven attempt to get the latest information on three of the biggest health challenges that face every American today. Teams of students will try to understand and present both sides of controversial issues related to these diseases. First-year students only. Prerequisite: L.BIO-115 or L.BIO-116 with a C or better. 3 credits. January term. Dependent upon staff and demand.

L.BIO-220: Microbiology

A basic course in microbiology stressing growth processes, culturing techniques, the role of microorganisms in disease and their control and applied microbiology. Prerequisite: L.BIO-115 and 116 or equivalent. Three lecture periods and one two-hour laboratory period per week. 4 credits. Dependent upon staff and demand.

L.BIO-222: Evolution in Darwin's Culture

This course is an in-depth introduction to the fundamentals of evolution and an exploration of cultural conflicts that arose because of the idea of evolution. The Origin of Species was published by Charles Darwin in 1859 and immediately started the first worldwide scientific debate. At this time in Victorian England the connections between science and nearly every other aspect of culture were becoming increasingly evident, and there was great tension about the role that science should play in a modern, industrial society. This course uses the "Reacting to the Past" experiential, role-playing game format where students will be reading, writing, and speaking from the perspective of a person in this time and place. The scientific and cultural issues of the time that will be discussed include natural selection and design; implications of Darwinism for: social reform, racial theories, and women's rights; professionalization of science; and inductive/deductive reasoning. Cultural conflicts related to evolution have continued today even after years of verification of Darwin's ideas. In the last week of the class, students will read and discuss a book on modern evolutionary facts, comparing it to Darwin's writings, creationism, and Intelligent Design. Has the debate changed in modern culture? 3 credits. January term. Dependent upon staff and demand.

L.BIO-225: Human Anatomy & Physiology I

This course provides an introduction to anatomical terminology and provides instruction related to understanding of how the body is organized both regionally and systemically. Topics include the organization of the musculoskeletal, nervous, cardiopulmonary, digestive, renal, and sensory systems. This course provides students with an anatomical foundation for understanding the physiology of the human body. Prerequisite: L.BIO-115. 4 credits. Each fall semester.

L.BIO-226: Human Anatomy & Physiology II

This course applies the anatomical features of the body as they relate to body function. Topics include the functioning of the musculoskeletal, nervous, cardiopulmonary, digestive, renal, endocrine and sensory systems. This course will allow students to understand the encompassing role of all body systems in maintaining homeostasis within the body. Prerequisite: L.BIO-225. 4 credits. Each spring semester.

L.BIO-231: Vertebrate Zoology

An introduction to the basic principles of ichthyology, herpetology, ornithology and mammalogy, emphasizing life histories of local vertebrates. Laboratory experiences include use of identification keys, collection and preservation of specimens, and field observations. Course fee assessed for trip to Mississippi River Museum & Aquarium. Prerequisite: L.BIO- 116 or equivalent. Two lecture periods and one three-hour laboratory period per week. 3 credits. Dependent upon staff and demand.

L.BIO-235: Plants & Human Health-ES

This course is designed to help students articulate the role of plants in human health and well-being in both historical and modern contexts. Over time, the human ability to manipulate and use plants has become increasingly sophisticated. The major themes that students will explore during this course will be the role of plants in human nutrition and food security, human health and medicinal, psychoactive and hallucinogenic plants, biotechnology and alternative medicine. A wide variety of laboratory projects and travel within the Dubuque area as well as to Madison will reinforce the various themes covered during the class sessions. 3 credits. January term. Dependent upon staff and demand.

L.BIO-240: Plant Biology

A course designed to introduce students to the basic biology of members of the plant kingdom, primarily the vascular plants. Major topical coverage will include evolution, reproduction, physiology, anatomy, developmental morphology, ecology and systematics. Minor topical coverage will include discussion of other photosynthetic

groups and plant allies. Prerequisite: L.BIO- 116 or equivalent. Three hours lecture and one three-hour laboratory period per week. 4 credits. Each fall semester.

L.BIO-242: Microbes-AH

This course is designed to furnish students with a basic knowledge of Microbiology and its impact on humans. Students will design their own experiments and, through the example of Microbiology, explore the strengths and weaknesses of this approach for problem solving. Topics will include the role of microorganisms in disease, body defenses against microbes, and the impact of microbes on human history, biotechnology, and germ warfare. Prerequisites: L.LIB-100, L.LIB-105, L.LIB-110, and a Math Modeling (-FM) course. 3 credits. Dependent upon staff and demand.

L.BIO-248: Science of Food & Cooking-AH

This is an in-depth study course that will immerse students in a close examination of the science behind the food they eat and the methods used to prepare it. Scientific topics explored may include botany of seeds and edible plants, the chemistry of cooking at high and low temperatures, protein structure and function in yogurt production, the chemical activity of different leavening agents in cake-baking, the science of bacterial contamination and food safety, among many others. A primary learning technique will be independent student-led kitchen research projects outside of class. Students must have reliable access to a kitchen, basic cooking and baking equipment, and transportation to a grocery store for supplies, which must be purchased separately from the course fee. Prerequisites: L.LIB100, L.LIB-105, L.LIB-110, and a Math Modeling (-FM) course. 3 credits. January term. Dependent upon staff and demand.

L.BIO-250: Genetics

An introduction to the principles of Mendelian and biochemical genetics. Prerequisite: L.BIO-115 or equivalent. Three lecture periods and one three-hour laboratory per week. 4 credits. Each spring semester.

L.BIO-255: Evolution

An introduction to the principles of organic evolution, mechanistic origins of life and diversity. Concepts of natural selection, genetic drift, gene flow and mutation are used to explain changes in gene frequency. One three-hour lecture period per week. 3 credits. Dependent upon staff and demand.

L.BIO-257: Fundamentals of Public Health

This course will provide a broad overview of the field of public health, and provide an understanding of how public health affects everyone's daily life and contributes and influences health and well-being of individuals and communities. This course aims to go beyond individual prevention and aims to provide students with a better understanding of the larger social and population-based factors that influence health and well-being of populations. Cross-listed as L.KIN-257. 3 credits. Spring term.

L.BIO-259: Issues in Environmental Biology-AH, ES

This course will give students hands-on experience in learning the science behind several current environmental issues like clear-cutting, species diversity, erosion control, water quality, prairie habitat restoration, urban sprawl, or neotropical bird migration. Outdoor and indoor projects will be used to help students learn how science is used to make decisions about various issues in environmental biology. Prerequisites for AH course: L.LIB-100, L.LIB105, L.LIB-110, and a Mathematical Modeling (-FM) course. 4 credits. Dependent upon staff and demand.

L.BIO-260: Human Anatomy & Physiology-AH, ES

A course designed for non-biology majors that investigates everyday structure and normal function of the human systems. In addition, some common diseases, the role of genes, health issues and interactions with our environment will be discussed. Other topics may include the biology of cancer, AIDS, and effects of alcohol and drugs upon bodily function. Prerequisites for AH course: L.LIB-100, L.LIB-105, L.LIB-110, and a Mathematical Modeling (-FM) course. Three lecture periods and one two-hour laboratory period per week. 4 credits. Each spring semester.

L.BIO-265: Issues in Bird Biology-AH, ES

This is a student-centered, active learning course on basic bird biology; students will generate questions about aspects of bird biology and use the scientific method, computers, scientific equipment, statistical analysis and basic field sampling techniques to collect data and test hypotheses about birds in their natural outdoor environment and/or caged birds; students will learn basic identification, behavior, ecology, and controversial environmental issues of birds; students will spend at least six (6) class periods outside observing, identifying and collecting data from local bird populations. Prerequisites for AH course: L.LIB-100, L.LIB-105, L.LIB-110, and a Mathematical Modeling (-FM) course. Dependent upon staff and demand. 4 credits.

L.BIO-270: Human Exercise: Measurements & Limits-AH

Students will be working in groups to pose questions about human exercise, predict their outcome, measure the body's response to exercise with various equipment and then interpret its meaning and application from the experimental output. Thus, students will be immersed in the scientific method, learning to do science and applying it to everyday exercise. Prerequisites: L.LIB-100, L.LIB-105, L.LIB-110, and a Mathematical Modeling (-FM) course, and one college-level science course. 4 credits. Dependent upon staff and demand.

L.BIO-272: Biology of Women-AH

This course is a study of basic biological principles in the context of the unique biology of women. Areas of study include what it means biologically to be female, reproductive anatomy and physiology, genetics and development, women and cancer, pregnancy, infertility, contraception, menopause, and research biases in the study of women's health. Lab experiments will focus on using the scientific method and explorations in developmental biology. Prerequisites: L.LIB-100, L.LIB-105, L.LIB-110, and a Mathematical Modeling (-FM) course. 4 credits. Dependent upon staff and demand.

L.BIO-273: Human Genetics-AH

This course will help students understand the importance and impact of genetics in their lives. Topics will include genetic testing and prenatal diagnosis, genetic engineering, use of DNA evidence in the courts, and eugenics. Labs will include use of PCR and Gel electrophoresis in DNA fingerprinting, genetic engineering and testing for genetically modified foods. Prerequisites: L.LIB-100, L.LIB-105, L.LIB-110, and a Mathematical Modeling (-FM) course. 3 credits. Each fall semester.

L.BIO-277: Biostatistics-QR

In this course, students will be introduced to the collection, analysis, and communication of quantitative information, skills which are increasingly important in our data-driven world. Through this process, students will use mathematical and statistical models to understand past behavior and make predictions regarding various real-world situations. In addition, students will learn common pitfalls and abuses in the manipulation and communication of data. 3 credits.

L.BIO-278: Experimental Design

This course involves the design and implementation of a semester-long group research project culminating in a formal scientific paper or poster presentation. Concepts include inductive vs. deductive reasoning, sample size determination, experimental vs control (placebo) groups. Skill development involves group collaboration, literature searching, the use of statistical software for data analysis, and peer review. 1 credit.

L.BIO-280: Sustainable India – the Interface of Nature-Economy-Society-AH

This study travel J-term course to India will explore sustainability issues in India with an emphasis on environmental sustainability. This course will focus on major environmental issues such as threats to biodiversity, forest and wildlife conservation, urban pollution, climate change, eco-tourism, and challenges, strategies and innovative solutions. Students will examine these issues in urban and wilderness areas through first-hand experience gained via field trips and opportunities to interact directly with and learn from experts such as resource managers, policy makers and scientists in India. Students will use the scientific method of inquiry to generate questions, develop hypotheses, design and conduct field projects. They will be required to examine the

issues through multiple lenses of ecology, ethics, and socioeconomics. They will share their findings with their peers. Students will have an understanding and appreciation of the delicate balance and interconnectedness between environmental protection and the needs of people especially in developing countries where alternatives and choices may be limited. 3 credits. L.LIB-100, L.LIB-105, L.LIB-110, and a Mathematical Modeling (-FM) course. 3 credits. Every third January term.

L.BIO-300: Intensive Science Research Experience

This is an in-depth course designed to give students majoring in one of the sciences an intense, full-time research experience in their sub-discipline. The intensive research experiences will allow the student to perform experiments toward novel scientific findings, not simply a pre-packaged lab with the results already determined. Topics to be covered in the seminars include: Why are controls so important in research? How do I evaluate if research I read or hear about in the news is valid and sound scientifically? How do I read a scientific research paper? Prerequisites: L.BIO-115, and consent of mentor and instructor. 3 credits. January term. Dependent upon staff and demand.

L.BIO-310: Animal Behavior

This is a seminar course designed to explore current topics in the area of animal behavior in the context of evolutionary theory. Topics may include mate choice, parental care, group formation, or habitat selection, with emphasis on birds and mammals. Students will learn to read and critically evaluate articles from the primary literature, and will be responsible for leading class discussion on a topic of their choice. Prerequisite: L.BIO-115 or higher BIO course or L.PSY-101 or higher PSY course. 2 credits. Spring semester, odd-numbered years.

L.BIO-315: Bird Conservation in South Texas

This course is a 14-day study travel field course in south Texas. Students will visit 12 different regional and national wildlife refuges as well as private sanctuaries that contain unique habitat and bird species that depend on these habitats. They will talk directly with wildlife managers in these areas to get answers to questions and understand the challenges that these people and birds face each day. Each student will learn basic bird identification, current conservation issues and ecology at each of the sites. 3 credits. January term. Dependent upon staff and demand.

L.BIO-320: Subtropical Ecology

This course consists of a two-week field trip (lecture/laboratory) to several subtropical natural communities in Florida. Study sites and topics include exotic plant biology and management, migratory birds, cypress and mangrove swamp biology, Everglades, water resource management, and intertidal zone and coral reef biology of the Keys. Prerequisites: One college biology course and permission of the instructor. An additional fee will be charged for transportation, meals and campsite costs. 2 credits. Dependent upon staff and demand.

L.BIO-325: Environmental Issues in Costa Rica-AH

This course is a 12-day study travel field course in Costa Rica. Students will visit and compare three different forest ecosystems: tropical wet forest, tropical dry forest, and high elevation tropical cloud forest. Environmental issues including hydroelectric power, rainforest logging, agricultural land use, coffee production, and maintenance of biodiversity will be discussed. Not open to first year students. Additional fee charged for travel, lodging, food and activity costs. Prerequisites: an introductory course in biology; L.LIB-100, L.LIB-105, L.LIB-110, and a Mathematical Modeling (-FM) course. 3 credits. Every third January term.

L.BIO-330: Evolutionary Ecology

This course investigates the relationships between organisms and their physical and biological environments. Both theoretical and experimental approaches will be used to examine factors regulating populations and the structuring of natural communities and ecosystems. Prerequisite: L.BIO-115 and L.BIO-116 or equivalent; L.BIO-277 and L.BIO-278 highly recommended. Three lecture or discussion periods and one three-hour laboratory period per week. 4 credits. Each spring semester.

L.BIO-345: Neurobiology

An introduction to regulatory homeostasis as mediated by the vertebrate nervous system with emphases on cellular communication, formation of neural circuits and afferent interneuron efferent pathways. Implications of neurotransmitter imbalance during disease and various mental disorders is also discussed. Two lecture periods per week. Prerequisite: L.BIO-1 15 or equivalent. 3 credits. Dependent upon staff and demand

L.BIO-348: Immunology

This course will provide a basic overview of the human immune system, including both innate and adaptive immunity and the recent discoveries on the interaction of the two systems. The topics will include: immune cell functions, antibody production and function, immune response to infectious diseases (AIDS, others), allergies, and vaccine and transplant biology. Defects of the immune system leading to autoimmune diseases and immunodeficiencies will also be discussed. Lectures and class discussions, including many case studies and "Disease Fridays" will be utilized to meet course objectives. Prerequisite: L.BIO-115. Not open to first year students. 3 credits. Dependent upon staff and demand.

L.BIO-365: Human Anatomy

A course on the detailed structure of the human body, including systems, organs and tissues. Prerequisite: L.BIO-110 or 115 or equivalent. Open to seniors only if instructor permission required. Three lecture periods and one two-hour laboratory period per week. 4 credits. Each spring semester.

L.BIO-375: Conservation Biology-AH

This course examines basic concepts of biological conservation. Topics include structure and function of ecosystems and threats to global biodiversity, including environmental degradation, extinction, and exotic species introductions. Students will use computer simulations and field techniques to learn effective conservation practices. One lecture period and one four-hour laboratory/field period per week. Prerequisites: L.LIB-100, L.LIB-105, L.LIB-110, and a Mathematical Modeling (-FM) course. 4 credits. Dependent upon staff and demand.

L.BIO-389: Junior Seminar

Develops communication skills, both written and oral, for the dissemination of research in the biological sciences. Assignment of thesis advisor and signed approval of introduction, materials and methods and literature cited sections required to receive credit. Course restricted to Junior standing and a declared major in biology or biology research. 1 credit. Each fall semester.

L.BIO-392: Field Experience

This course gives credit for shadowing professionals in the workplace. Students usually do observation for a total of 45 hours per semester. Can be taken only once for credit. Liability insurance must be checked before placement. Prerequisite: junior standing. Hours of participation are arranged between student and mentor. 1 credit. Each spring semester.

L.BIO-401: Honors Senior Thesis Research

Intensive individual research project and written thesis terminating with a presentation of results at a regional, national or international scientific forum. Prerequisite: L.BIO-389. 1 credit. Each semester.

L.BIO-410: Cell & Molecular Biology

A study of the cellular basis of life processes, particularly the molecular, macromolecular, organelle and intercellular structural and functional interrelations. The structure, assembly and functions of macromolecular organelles will also be investigated. Prerequisites: L.BIO-115 or equivalent and L.CHE-233. Three lecture periods and one three-hour laboratory period per week. 4 credits. Each spring semester.

L.BIO-420: Vertebrate Physiology

A course in the basic physiological processes of humans and other vertebrates. The function and coordination of cells, organs and systems of humans and some vertebrates are studied. Prerequisites: L.BIO 115 or 116; L.CHE-233. Three lecture periods and one two-hour laboratory period per week. 4 credits. Each Fall semester.

L.BIO-487: Senior Seminar Research Portfolio-PJ, IN

This course is the first part of the year-long Senior seminar capstone. During it, Biological Research majors will continue their thesis research papers begun in Junior seminar. This course will assist students in demonstrating transferable knowledge and skills that they have developed through their liberal arts education at Loras College through the development of a portfolio. In addition, the course provides students with the opportunity to professionally present their strengths and accomplishments through the development of a cover letter and resume. This course satisfies the portfolio requirements for biology research students. Prerequisite: L.BIO-389. 2 credits. Each fall semester

L.BIO-488: Senior Seminar Portfolio-PJ, IN

This course is the first part of the year-long Senior seminar capstone. During it, Biology Majors will continue their thesis research and review papers begun in Junior seminar. This course will assist Biology students in demonstrating transferable knowledge and skills that they have developed through their liberal arts education at Loras College through the development of a portfolio. In addition, the course provides students with the opportunity to professionally present their strengths and accomplishments through the development of a cover letter and resume. This course satisfies the portfolio requirements for all biology students. Prerequisite: L.BIO-389. 2 credits. Each fall semester.

L.BIO-489: Senior Seminar Presentation of thesis research for the biological research major; presentation of selected topic of current interest for the biology major. Prerequisite: L.BIO-279 and L.BIO-487 or L.BIO-488. 1 credit. Each spring semester.