

BIOLOGY (BIOL)

Subject-area course lists indicate courses currently active for offering at the University of Louisville. Not all courses are scheduled in any given academic term. For class offerings in a specific semester, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>).

500-level courses generally are included in both the undergraduate- and graduate-level course listings; however, specific course/section offerings may vary between semesters. Students are responsible for ensuring that they enroll in courses that are applicable to their particular academic programs.

Course Fees

Some courses may carry fees beyond the standard tuition costs to cover additional support or materials. Program-, subject- and course-specific fee information can be found on the Office of the Bursar website (<http://louisville.edu/bursar/tuitionfee/>).

BIOL 501. Independent Study 1-3 Units

Prerequisite(s): Faculty consent, minimum cumulative GPA of 3.0, and completion of biology core.

Description: Independent study in a selected subject area with a student-selected faculty member.

Note: No more than 6 hours of Undergraduate Research (BIOL 404, BIOL 405 or BIOL 406 WR) or Independent Study (BIOL 501, BIOL 502 or BIOL 504 WR) may be used to meet the minimum in Biology for the BA or BS.

Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 502. Independent Study 1-3 Units

Prerequisite(s): Faculty consent, minimum cumulative GPA of 3.0, and completion of biology core.

Description: Independent study in a selected subject area with a student-selected faculty member.

Note: No more than 6 hours of Undergraduate Research (BIOL 404, BIOL 405 or BIOL 406 WR) or Independent Study (BIOL 501, BIOL 502 or BIOL 504 WR) may be used to meet the minimum in Biology for the BA or BS.

Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 504. Independent Study - WR 1-3 Units

Term Typically Offered: Occasionally Offered

Prerequisite(s): Faculty consent, minimum cumulative GPA of 3.0, and completion of the Biology core.

Description: Independent study in a selected subject area with a student-selected faculty member.

Note: No more than 6 hours of Undergraduate Research (BIOL 404, BIOL 405 or BIOL 406 WR) or Independent Study (BIOL 501, BIOL 502 or BIOL 504 WR) may be used to meet the minimum in Biology for the BA or BS.

Note: Approved for the Arts and Sciences upper-level requirement in written communication (WR).

Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 510. Behavioral Ecology 3 Units

Term Typically Offered: Occasionally Offered

Prerequisite(s): BIOL 363.

Description: Evolution of behavioral adaptations for survival and reproduction; topics will include foraging, aggression, mate choice, mating strategies, and sociality.

Note: Credit may not be earned for both BIOL 510 and BIOL 610.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 511. Behavioral Endocrinology - WR, CUE 3 Units

Term Typically Offered: Occasionally Offered

Prerequisite(s): BIOL 465.

Description: Interactions of hormones, brain, behavior.

Note: Credit may not be earned in both BIOL 511 and BIOL 611.

Note: Approved for the Arts and Sciences upper-level requirement in written communication (WR).

Note: Cross-listed with BIOL 611.

Course Attribute(s): CUE - This course fulfills the Culminating Undergraduate Experience (CUE) requirement for certain degree programs. CUE courses are advanced-level courses intended for majors with at least 90 earned credits/senior-level status.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 512. Endocrinology 3 Units

Prerequisite(s): BIOL 465.

Description: Chemical regulation in animals.

Note: Credit may not be earned in both BIOL 512 and BIOL 612.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

<p>BIOL 514. Ornithology 3 Units Prerequisite(s): BIOL 242 and BIOL 244, or consent of instructor. Fee: An additional \$40.00 is charged for this course. Description: Evolution, morphology, diversity, ecology, and behavior of birds. Lab stresses field identification of birds. Note: Credit may not be earned in both BIOL 514 and BIOL 614.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>BIOL 541. Medicinal Plant Biochemistry - CUE, WR 3 Units Term Typically Offered: Occasionally Offered Prerequisite(s): BIOL 540, CHEM 445, CHEM 545, or BIOC 545. Fee: An additional \$40.00 is charged for this course. Description: A detailed study of biosynthesis and bioactivity of specialized plant metabolites (secondary metabolites). Topics will include aspects of general plant metabolism as well as specialized metabolism pathways (alkaloids, terpenes and phenolics) and will include a survey of approaches as they relate to discovery of bioactive plant metabolites and a review of known plant metabolites used to treat human diseases/disorders. Note: Approved for the Arts and Sciences upper-level requirement in written communication (WR). Course Attribute(s): CUE - This course fulfills the Culminating Undergraduate Experience (CUE) requirement for certain degree programs. CUE courses are advanced-level courses intended for majors with at least 90 earned credits/senior-level status.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>BIOL 515. Environmental Physiology 3 Units Term Typically Offered: Occasionally Offered Prerequisite(s): BIOL 240, BIOL 242 and BIOL 244 (or equivalent); or permission of department. Description: Study of the physiological, morphological, behavioral and biochemical responses by eukaryotic organisms (primarily animals) to major physical and chemical factors of their environment. Note: Credit may not be earned in both BIOL 515 and BIOL 615.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>BIOL 542. Gene Structure and Function - WR 3 Units Prerequisite(s): BIOL 330 or equivalent, or consent of instructor. Description: Advanced topics in genetics of prokaryotes and eukaryotes, including chromosome structure and function, and gene regulation. Note: Approved for the Arts & Sciences upper-level requirement in written communication (WR). Note: Credit may not be earned for both BIOL 542 and BIOL 642.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>BIOL 519. Ichthyology 3 Units Prerequisite(s): BIOL 363. Fee: An additional \$40.00 is charged for this course. Description: Introduction to anatomy, physiology, ecology, distribution, economic importance, and classification of major groups and representative local species of fish. Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>BIOL 548. Experimental Design and Analysis - CUE, WR 3 Units Prerequisite(s): BIOL 350 or BIOL 651. Description: Move principles of sound experimental design, analysis and presentation from recognition to active vocabulary. Students completing the course can serve as statistical consultants for moderately complex statistical designs. Note: Approved for the Arts and Sciences upper-level requirement in written communication (WR). Course Attribute(s): CUE - This course fulfills the Culminating Undergraduate Experience (CUE) requirement for certain degree programs. CUE courses are advanced-level courses intended for majors with at least 90 earned credits/senior-level status.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>BIOL 522. Aquatic Ecology 4 Units Prerequisite(s): BIOL 363. Description: Ecological processes in aquatic environments with primary emphasis on lakes and reservoirs. Note: Credit may not be earned in both BIOL 522 and BIOL 622.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>BIOL 552. Evolutionary Medicine 3 Units Term Typically Offered: Occasionally Offered Prerequisite(s): BIOL 240, BIOL 242, BIOL 372, or BIOL 409, or equivalents. Description: In-depth analyses at the interface of evolutionary biology and the health sciences using readings from the primary literature. Format involves lectures, discussion, and a library-based research project. Note: Credit may not be earned in both BIOL 552 and BIOL 652.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>BIOL 540. Metabolic Biochemistry 3 Units Term Typically Offered: Occasionally Offered Prerequisite(s): BIOL 329 and CHEM 342. Description: An advanced study of metabolic pathways including synthesis of macromolecules (proteins, nucleic acids, lipids, carbohydrates), mechanisms of metabolic control and utilization of metabolic intermediates. Note: Credit may not be earned in both BIOL 540 and BIOL 640.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>

<p>BIOL 553. Chronic Disease Biology Term Typically Offered: Occasionally Offered Prerequisite(s): BIOL 329 and BIOL 372. Description: The course will cover the biological bases of chronic disease, with an emphasis on the mechanisms of disease causation and the evolution of these mechanisms. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>	<p>BIOL 567. Conservation Biology Term Typically Offered: Spring Only Prerequisite(s): BIOL 363 or permission of instructor. Description: This course provides an overview of theory and practice of conservation. Topics include biodiversity, habitat loss, the effects of habitat changes on populations, and the design and establishment of reserves. Among other things, students will learn: 1) key terms and concepts related to biodiversity, 2) significant threats to biodiversity and efforts to mitigate them, and 3) practical and socioeconomic elements of conservation biology. Note: Credit may not be earned for both BIOL 567 and BIOL 667.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>
<p>BIOL 555. Microbial Ecology Prerequisite(s): BIOL 357, or BIOL 485, or consent of instructor. Description: Interrelationships between microorganisms and their environments. Note: Credit may not be earned in both BIOL 555 and BIOL 655.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>	<p>BIOL 569. Evolution Prerequisite(s): BIOL 363. Description: Offers a comprehensive overview of evolution and provides students with a review of issues that make up this critical discipline. Note: Credit may not be earned in both BIOL 569 and BIOL 669. Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>
<p>BIOL 560. Ecology of Urban and Suburban Landscapes Term Typically Offered: Spring Odd Years Prerequisite(s): BIOL 363 or GEOS 365. Description: Effects of cities and suburban sprawl on air and water chemistry, microclimate, fragmented landscapes, and responses of biotic and human communities to these conditions that degrade or promote urban resilience, adaptation and sustainability. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>	<p>BIOL 571. Selected Topics Term Typically Offered: Occasionally Offered Description: Contents to be indicated in schedule of courses. Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>
<p>BIOL 562. Ecosystems Ecology Term Typically Offered: Spring Even Years Prerequisite(s): BIOL 363; an advanced ecology course recommended. Description: The transformations of matter and energy that link plant, animal and geochemical cycles. Implications for resource management also discussed. Note: Credit may not be earned in both BIOL 562 and BIOL 662.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>	<p>BIOL 572. Selected Topics-Laboratory Description: Contents to be indicated in schedule of courses. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>1-4 Units</p>
<p>BIOL 563. Population and Community Ecology Term Typically Offered: Spring Only Prerequisite(s): BIOL 363. Description: Introduction to population dynamics and species interactions in aquatic and terrestrial ecosystems. Review of underlying ecological theory and its applications for conserving biodiversity. Note: Credit may not be earned in both BIOL 563 and BIOL 663.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>	<p>BIOL 591. Biology for Teachers I Term Typically Offered: Occasionally Offered Prerequisite(s): Experience in teaching biology or biological principles in elementary, middle or secondary school. Description: Teaching pre-college biology with emphasis on curriculum content, laboratory procedures, and process skills. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>

BIOL 593. Experimental Cell Biology for Teachers 3 Units Prerequisite(s): BIOL 240, BIOL 242, BIOL 244, BIOL 329, BIOL 330, and BIOL 331 or equivalent; or consent of instructor. Description: Lecture and lab activities focused on inquiry-based investigations at the cellular level suitable for secondary school classroom. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)	BIOL 611. Advanced Behavioral Endocrinology 4 Units Prerequisite(s): Graduate standing. Description: Interactions of hormones, brain and behavior. Lecture concurrent with BIOL 511; more advanced material through requirement of independent study or research project. Note: Credit may not be earned in both BIOL 511 and BIOL 611. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)
BIOL 594. Experimental Botany for Teachers 3 Units Prerequisite(s): BIOL 240, BIOL 242, BIOL 244, BIOL 329, BIOL 330, BIOL 331 or equivalent, or consent of instructor. Description: This course is designed for pre-service and classroom teachers of the life sciences from elementary through high school. To increase teachers' abilities to teach sciences, especially botany, using inquiry-oriented strategies. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)	BIOL 612. Advanced Endocrinology 4 Units Prerequisite(s): BIOL 465. Description: Chemical regulation in animals, primarily mammals. Lectures concurrent with BIOL 512; more advanced material through requirement of independent study or research project. Note: Credit may not be earned in both BIOL 512 and BIOL 612. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)
BIOL 600. Graduate Seminar I 1 Unit Prerequisite(s): Graduate status. Description: Covers professional development for graduate students in all fields of biology. Topics include the following: time management, how to collect and record data, data management, communication with advisor and advisory committee, finding a research question, grant proposals and funding, scientific ethics, use of graphics, writing and reviewing scientific papers, and careers and interviews. Each student will write a short grant proposal, review a scientific paper, and make a short oral presentation. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)	BIOL 614. Advanced Ornithology 4 Units Prerequisite(s): Consent of instructor. Description: Evolution, morphology, diversity, ecology and behavior of birds. Lab stresses field identification of birds. Lecture concurrent with BIOL 514; more advanced material through requirement of independent study or research project. Note: Credit may not be earned in both BIOL 514 and BIOL 614. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)
BIOL 601. Graduate Seminar II 1 Unit Prerequisite(s): Graduate status. Description: Focuses on developing presentation skills for graduate students in all fields of biology. We will also discuss how to evaluate presentations. Each student will make a presentation on research in their area of interest and will respond to audience questions. Students will provide written feedback to each other on their presentations. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)	BIOL 615. Advanced Environmental Physiology 4 Units Prerequisite(s): BIOL 240, BIOL 242 and BIOL 244 (or equivalent); or permission of department. Description: Study of the physiological, morphological, behavioral and biochemical responses by eukaryotic organisms (primarily animals) to major physical and chemical factors of their environment. Lectures concurrent with BIOL 515; BIOL 615 has additional requirements (because it is a 4-credit hour class) through the completion of an independent study or research project. Note: Credit may not be earned in both BIOL 515 and BIOL 615. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)
BIOL 610. Advanced Behavioral Ecology 4 Units Prerequisite(s): BIOL 363. Description: Evolution of behavioral adaptations for survival and reproduction; topics will include foraging, aggression, mate choice, mating strategies, and sociality. Note: Credit may not be earned for both BIOL 510 and BIOL 610. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)	BIOL 619. Environmental Entomology 3 Units Prerequisite(s): BIOL 382, or consent of instructor. Description: Advanced topics in insect systematics, ecology, and applied entomology. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

- BIOL 622. Advanced Aquatic Ecology** 5 Units
Prerequisite(s): BIOL 363.
Description: Ecological processes in aquatic environments with primary emphasis on lakes and reservoirs. Lectures concurrent with BIOL 522; more advanced material through requirement of independent study or research project.
Note: Credit may not be earned in both BIOL 522 and BIOL 622.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 633. Advanced Physiological Plant Ecology** 5 Units
Prerequisite(s): BIOL 523 and BIOL 563.
Description: A study of chemical, physical, and biological processes involved in plant ecology.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 635. Advanced Chemical Ecology** 4 Units
Term Typically Offered: Spring Only
Description: This course will explore the remarkable world of chemical ecology. Where ecological outcomes between or among individuals are influenced or determined directly or indirectly by chemicals produced by individuals. A key focus will be the chemical ecology of plants. Though we will also explore chemical ecology in animals as well. Considerable ecological information is derived from chemicals produced by organisms both to other members of the same species or to a different species, and affect both natural and sexual selection. We will use an interactive discussion/seminar-style to interrogate the primary literature for current knowledge of how chemical cues influence a diverse array of ecological interactions. From the African savannas to galling insects in our own backyard. Students will have flexibility to choose their own research topics to pursue focused critical thinking and hypothesis generation. Discussions will span a range of disciplines including genetics, molecular biology, biochemistry, natural products, ecology, and evolution. Graduate students will be required to write a publication-quality review paper or meta analysis on a topic related to chemical ecology.
Note: Students may not receive credit for both BIOL 435 and BIOL 635.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 640. Advanced Metabolic Biochemistry** 4 Units
Prerequisite(s): BIOL 329 and CHEM 342.
Description: An advanced study of methods of metabolic pathways including synthesis of macromolecules (proteins, nucleic acids, lipids, carbohydrates), mechanisms of metabolic control and utilization of metabolic intermediates.
Note: Credit may not be earned in both BIOL 540 and BIOL 640.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 641. Advanced Medicinal Plant Biochemistry** 4 Units
Prerequisite(s): BIOL 640 or consent of instructor.
Fee: An additional \$40.00 is charged for this course.
Description: An advanced detailed study of biosynthesis and bioactivity of specialized plant metabolites (secondary metabolites). Topics will include aspects of general plant metabolism as well as specialized metabolism pathways (alkaloids, terpenes, and phenolics) and will include a survey of approaches as they relate to discovery of bioactive plant metabolites and a review of known plant metabolites used to treat human diseases/disorders.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 642. Advanced Gene Structure and Function** 4 Units
Prerequisite(s): BIOL 330 or equivalent.
Description: Advanced topics in genetics of prokaryotes and eukaryotes, including chromosome structure and function, and gene regulation. Lectures concurrent with BIOL 542; more advanced material through requirement of independent study or research project.
Note: Credit may not be earned in both BIOL 542 and BIOL 642.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 643. Advanced Developmental Biology** 4 Units
Description: Developmental biology is the study of how multicellular organisms process from a single cell to their adult forms. This simple statement, however, belies the incredible complexity of the process, which involves the coordinated actions and interactions of tens of thousands of genes, millions of molecular signals, and, in humans and other large mammals, tens of trillions of cells. This course highlights critical themes in animal development, including cell division; cell differentiation; and morphogenesis, and covers specific topics such as developmental anatomy; embryo development; axis formation, organ, tissue, and limb development; and cell-cell communication. The course also briefly addresses the similarities and differences in developmental strategies among animals and other multicellular organisms.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 644. Global Change Ecology** 4 Units
Description: Human causes of global-scale changes in climate, air and water resources, and biodiversity, and impacts on people; approaches to addressing these problems that promote sustainable societies. Graduate students will attend lectures with undergraduates taking BIOL 440 but will be expected to attend weekly discussions of primary literature and course material. In addition, graduate students will be expected to write a literature review on a topic relevant to the course subject matter.
Note: Cross-listed with BIOL 440.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 648. Advanced Experimental Design and Analysis 4 Units

Prerequisite(s): BIOL 350 or BIOL 651 or permission of instructor.

Description: Move principles of sound experimental design, analysis and presentation from recognition to active vocabulary. Students completing the course can serve as statistical consultants for moderately complex statistical designs.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 650. Advanced Biostatistics 4 Units

Prerequisite(s): MATH 180 or MATH 205; an introductory course in statistics; or consent of instructor.

Description: Application of statistical methods commonly used in life sciences, with emphasis on interpretation of experimental data.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 651. Advanced Biostatistics II 3 Units

Prerequisite(s): BIOL 650.

Description: Advanced biostatistics involves interpretation of experimental data using statistical software. Topics include experimental design and ANOVA, ANCOVA, MANOVA, logistic analysis, logistic regression, and log linear models.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 652. Advanced Evolutionary Medicine 4 Units

Description: In-depth analyses at the interface of evolutionary biology and the health sciences using readings from the primary literature.

Format involves lectures, discussion, and a library-based research project. Lecture concurrent with BIOL 552; more advanced material through requirement of independent study or research project. BIOL 552 does not carry graduate credit.

Note: Credit may not be earned in both BIOL 552 and BIOL 652.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 653. Advanced Chronic Disease Biology 4 Units

Description: The course will cover the biological bases of chronic disease, with an emphasis on the mechanisms of disease causation and the evolution of these mechanisms.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 655. Advanced Microbial Ecology 4 Units

Prerequisite(s): BIOL 357 or BIOL 485 or consent of instructor.

Description: Interrelationships between microorganisms and their environments. Lecture concurrent with BIOL 555; more advanced material through requirement of independent study or research project for students enrolling in BIOL 655.

Note: Credit may not be earned in both BIOL 555 and BIOL 655.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 660. Advanced Ecology of Urban and Suburban Landscapes 4 Units

Description: Effects of cities and suburban sprawl on air and water chemistry, microclimate, fragmented landscapes, and responses of biotic and human communities to these conditions that degrade or promote urban resilience, adaptation and sustainability.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 662. Advanced Ecosystems Ecology 4 Units

Description: The transformations of matter and energy that link plant, animal and geochemical cycles. Lectures concurrent with BIOL 562; more advanced material through requirement of independent study or research for students enrolling in BIOL 662.

Note: Credit may not be earned in both BIOL 562 and BIOL 662.

Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 663. Advanced Population and Community Ecology 4 Units

Description: Introduction to population dynamics and species interactions in aquatic and terrestrial ecosystems. Review of underlying ecological theory and its applications for conserving biodiversity. Lecture concurrent with BIOL 563; more advanced material through requirement of independent study or research project.

Note: Credit may not be earned in both BIOL 563 and BIOL 663.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 664. Research Methods in Ecology 3 Units

Prerequisite(s): BIOL 401 and BIOL 402.

Description: Introduction to experimental design, data collection and quantitative analyses. Field and laboratory research, statistical tools and critical evaluation data.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 667. Advanced Conservation Biology 4 Units

Prerequisite(s): BIOL 363 or permission of instructor.

Description: This course provides an overview of the theory and practice of biological conservation. Topics include biodiversity, habitat loss, the effects of habitat changes on populations, and the design and establishment of reserves. Among other things, students will learn: 1) key terms and concepts related to biodiversity, 2) significant threats to biodiversity and efforts to mitigate them, 3) practical and socioeconomic elements of conservation biology.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

- BIOL 668. Molecular Biology** 4 Units
Term Typically Offered: Spring Only
Prerequisite(s): Student must be registered in the graduate school.
Description: Students are expected to have a basic understanding of molecular biology principles and protein structure. Best preparation for succeeding in the course is previous course in biochemistry and experience with reading scientific literature. Permission from the Course Director is needed for students not meeting these prerequisites. This course examines the fundamental principles of molecular biology as they apply to mechanisms controlling gene expression. Topics include: transcriptional and post-transcriptional regulation of gene expression; RNA and miRNA biology; and protein synthesis and regulation. An emphasis will be on student-directed learning requiring completion of pre-class reading, and in-class discussion of current literature.
Note: Crosslisted with BIOC 668.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 669. Advanced Evolution** 4 Units
Prerequisite(s): BIOL 363.
Description: Offers a comprehensive overview of evolution and provides students with a review of issues that make up this critical discipline. Lecture concurrent with BIOL 569; more advanced material through requirement of independent study or research project.
Note: Credit may not be earned in both BIOL 569 and BIOL 669.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 671. Special Topics** 4 Units
Description: Topics to be indicated in schedule of courses.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 672. Selected Topics-Laboratory** 1-4 Units
Description: Contents to be indicated in the schedule of courses.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 673. Experimental Design and Analysis** 3 Units
Prerequisite(s): BIOL 651 or an equivalent.
Description: Discussion and analysis of practical issues arising in biology research, including interpretation of literature and applied exercises involving experimental design, analysis, and presentation.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 682. Advanced Entomology** 4 Units
Description: Examination of morphology, physiology, behavior, evolution and ecology of the major groups of insects. A collection of common insect families is required. The laboratory will include observations on live and preserved animals and possible field trips. Students will learn to: 1) use terms and concepts that describe the diversity of insects, 2) compare and contrast major insect groups with respect to structure and function, and 3) collect and prepare museum-quality specimens for scientific study. A project involving the student's interest in a particular group of insects and formal paper are required.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 688. Evolution of Disease Seminar** 1 Unit
Description: Students will be exposed to current research in Disease Evolution through discussion of papers, making presentations, and attending seminars by faculty members, students, and visiting speakers.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 689. Seminar** 1 Unit
Grading Basis: Pass/Fail
Description: Reports on personal research and on current literature, with a critique of the research and of the presentation. Attendance, but not course registration, is required of all graduate biology majors during each semester of residence.
Note: Only 2 hours of credit may be accumulated.
Note: Graded on pass-fail basis.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 690. Thesis Research** 1-6 Units
Grading Basis: Pass/Fail
Prerequisite(s): Consent of major professor.
Description: Research on MS thesis project. Grade shall be deferred by the major professor until evaluation of the thesis by the student's committee.
Note: Graded on pass-fail basis by the examining committee.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- BIOL 691. Independent Research** 1-6 Units
Prerequisite(s): Consent of instructor.
Description: Independent field or laboratory research on a problem not related to thesis or dissertation.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 692. Independent Study **1-6 Units**

Prerequisite(s): Consent of instructor.

Description: Independent library research on a problem not related to the thesis or dissertation.

Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

BIOL 700. Dissertation Research **1-9 Units**

Grading Basis: Pass/Fail

Prerequisite(s): Consent of major professor.

Description: Research on dissertation project. Grade shall be deferred by the major professor until evaluation of the dissertation by the student's committee.

Note: Graded on a pass-fail basis by the examining committee until evaluation of the dissertation by the student's committee.

Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)