

BIOLOGY DEPARTMENT COURSE DESCRIPTIONS - SPRING 2016

UNDERGRADUATE COURSES

Biology 123 **General Biology II** (3 credits) Wiles & Staff

Lecture - Monday AND Wednesday 12:45-2:05 pm OR 3:45-5:05 pm Giff Aud

Course Description: The second of a two-course sequence comprising a survey of major biological concepts ranging from the molecular level to global ecology. Units within Biology 123 include biodiversity, plant structure and function, human and comparative animal anatomy and function, ecology, and evolution, which is the central and unifying concept of biology and the framework around which the understanding of other concepts in this course is constructed.

Required Materials:

Textbooks: Campbell Biology General Biology I and II, Custom Edition for Syracuse University ISBN-13978-1-256-31055-6.

Exams: 4 per semester (3 during semester, 1 during final exam week); multiple choice; essays, quizzes, papers and reports in lab/recitation section.

Class size: 750 limit

Frequency of Offering: Each Spring semester

Biology 124 **General Biology II Laboratory** (1 credit) Wiles & Staff

Students registered for Bio 124 MUST also register for Bio 123.

Course Description: Laboratory course associated with BIO 123. Includes inquiry-based exploration and practical application of concepts discussed in BIO 123. One laboratory session per week.

Required Materials:

Textbooks: Campbell Biology General Biology I and II, Custom Edition for Syracuse University ISBN-13978-1-256-31055-6.

Class size: 24 students per section, (384 in total)

Frequency of Offering: Each Spring semester

Biology 200 **Peer Led Team Learning** (1-6 credits) Snyder

001	T	5:00-5:55	126 LSC
002	Th	5:00-5:55	126 LSC

Course Description: A course course that relates educational research literature on students and learning to classroom applications in problem solving activities. Students are prepared to be peer leaders of a small, problem-solving group of students by attending weekly one-hour meetings and participating in Blackboard and in-class discussion groups. Peer leaders are then responsible for holding a 1-hr problem solving session each week and keeping record of attendance for their group sessions.

Biology 211	Introduction to Neuroscience	(3 credits)	Shreckengost
MW	12:45-2:05	214 LSC	

Course Description: This course is an introduction to the mammalian nervous system, with emphasis on the structure and function of the human brain. Students interested in the Neuroscience Integrated Learning Major should know that this course is one of two possible entry-level required courses for that major. Topics include the cell biology and function of nerve cells and associated cells such as glia, selected sensory systems, and control of movement. Discussion of brain diseases and brain pathology will be used to illustrate brain function and structure concepts. Two lectures/week with numerous opportunities to participate in class discussions using remote personal response systems (“clickers”) throughout the course. The purchase and use of “clickers” is not mandatory, but is strongly recommended.

Prerequisites: High school biology and chemistry

Class size: 30

Biology 217	Anatomy & Physiology II	(4 credits)	Sweet
Lecture section:	001 MW 12:45-2:05	001 LSC	
Lab sections:	002 T 8:00-10:00	308 LSC	
	003 T 10:20-12:20	308 LSC	
	004 W 8:00-10:00	308 LSC	
	008 W 10:35-12:35	308 LSC	
Recitation sections:	005 M 8:00-9:20	300 LSC	
	006 Th 5:00-6:20	300 LSC	
	007 F 12:45-2:05	300 LSC	
	009 Th 5:00-6:20	214 LSC	

Course Description: A continuation of the BIO 216 lecture and laboratory course studying the structure and function of human tissues, organs and systems. The endocrine, respiratory, cardiovascular, digestive and reproductive systems and metabolism and energetics will be covered. Laboratories will include bench top and interactive computer experiments, anatomy, histology and non-invasive experiment on human subjects.

This course cannot be used to fulfill the requirements toward a biology major.

Textbooks: Seeley’s Anatomy & Physiology, Van Putte, Regan & Russo, 10th Ed.

Prerequisites: Bio 121-123 or equivalent

Examinations: Midterm & Final, plus weekly quizzes

Class size: 96

Frequency of Offering: Spring semesters

Biology 305	Integrative Biology Lab	(3 credits)	Lewis/Ritchie/Staff
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001 Lecture	M	10:35-12:05	001 LSC
002 Lab	T	12:30-4:30	146 LSC
003 Lab	T	12:30-4:30	148 LSC
004 Lab	W	12:45-4:45	146 LSC
005 Lab	W	12:45-4:45	148 LSC
006 Lab	Th	12:30-4:30	146 LSC
007 Lab	Th	12:30-4:30	148 LSC
008 Lab	F	12:45-4:45	146 LSC
009 Lab	F	12:45-4:45	148 LSC

Course Description: Provides students with early laboratory experience, presenting a quantitative, integrated view of subcellular, cellular, developmental, organismal, and ecosystem/environmental perspectives on biology.

Prerequisite: Bio 121 or equivalent and Bio 326 or Bio 327 or Bio 345

Biology 317	Anatomy & Physiology II for Bio Majors	(4 credits)	Sweet
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001 Lecture	MW	12:45-2:05	001 LSC
002 Lab	F	12:45-3:45	308 LSC
003 Lab	F	8:25-11:25	308 LSC

Course Description: This Anatomy & Physiology II course is a 300-level course for Biology & Biochemistry majors. It is a 4-credit course, of which 3 credits can be applied to the Biology major, unlike BIO 217. This class will have the same lecture room and time (Monday & Wednesdays 12:45-2:05 p.m.) as BIO 217. Students in the BIO 317 class will have weekly quizzes and midterm and final exams, as will those in BIO 217. However, the students registered for BIO 317 will have a joint laboratory and recitation section on Fridays from 8:25 am to 11:25 pm or 12:45 to 3:45 pm. These sections will not be the same as those laboratory and recitation sections in BIO 217. They will include a cat dissection, histology and other activities appropriate for a 300-level course. Understanding of laboratory material will be evaluated with 2-3 laboratory practicals.

Textbooks: Seeley's Anatomy & Physiology, VanPutte, Regan & Russo, 10th Ed. A Guide to Anatomy & Physiology Lab, Rust, and Mammalian Anatomy: The Cat, Fishbeck

Prerequisites: Bio 121-123 or equivalent

Examinations: Midterm & Final, plus weekly quizzes & 3 lab practical exams.

Class size: 48

Frequency of Offering: Spring semesters

Biology 326	Genetics	(3 credits)	Belote
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TTh	11:00-12:20	HBC Gifford Aud
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Course Description: Principles of inheritance, structure and synthesis of nucleic acids and proteins, microbial genetics, recombinant DNA technology and introduction to genomics.

Textbook: TBA

Prerequisites: Bio 121; Che 106

Class size: 350

Frequency of Offering: Each Spring semester

Biology 355 **General Physiology** (3 credits) Tupper

TTh 11:00-12:20 105 LSC

Course Description: A lecture course on the physiology of mammals including circulation, kidney function, nervous system, sensory systems, muscle, cardiac function and digestion.

Textbook: Human Physiology, Vander, Sherman & Luciano, 13th edition, 2013

Prerequisites: Bio 121; Che 106, 116

Class Size: 100

Biology 360 **Biology Laboratory Assistant** (1 credit) Wiles

M 3:45-5:05 134 LSC

Course Description: Students who have completed an upper-division 3-credit hour lab may receive one credit hour for assisting in the teaching of laboratories. This opportunity is especially appropriate for students considering teaching careers. May be repeated once for credit.

Textbook: None

Prerequisites: Permission of instructor in advance.

Examinations: None

Grade: A-F based upon participation & performance
semester

Frequency of Offering: Each

Biology 400/600-001 **Seminar in Neurodegenerative Disease** (3 credits) Korol

MW 2:15-3:35 156 LSC

Course Description: This seminar course is intended to review and to stimulate discussion about the current status of our knowledge about neurodegenerative diseases, emphasizing distinctions between pathological and healthy brain aging. While the main focus is on the etiology, neurobiology, and emergent symptoms of the diseases, broader biological, sociological, and historical perspectives are woven into the material. Seminar format including lectures, discussions, student presentations, and a variety of written assignments. Jrs. & Srs. only; others by permission.

Biology 400/600-002 Nervous System Insult & Repair/Recovery Strategies (3 credits) Shreckengost

TTh 2:00-3:20 214 LSC

Course Description: From the NFL's \$765 million settlement over concussion-related brain injuries to botulinum toxin type A (Botox®) injections for treatment of uncontrollable muscle spasms resulting from nervous system injury, we'll examine the changes that occur in the nervous system following injury and how we are attempting to treat those injuries. Students will gain an understanding of how our nervous systems and bodies respond to injury. We will explore both the immediate physiological effects of nervous system trauma and the long-term consequences of sustaining brain or spinal cord damage. Our bodies respond to injury in a number of ways. Particularly in the nervous system, some of our adaptive responses to injury can go awry, causing more harm than good. We will discuss the strategies our bodies employ in an attempt to repair damaged tissue. Finally, we'll look at historical and contemporary clinical interventions for early treatment of brain damage and rehabilitation tools assist individual's recovery from injury.

PreReq: BIO 211. Jrs. & Srs. only; others by permission.

Biology 400/600-003 **Advanced Field Biology** (2 credits) Segraves/Althoff

T 2:00-4:00 439 LSC

Course Description: Scientific methods and experimental design. Intensive field research conducted during spring break at the Archbold Biological Station in Florida. Design, implement, analyze a research project. Intensive reading and discussion of primary literature on projects conducted at the field station.

Active participation in discussion and projects is strongly encouraged. Participation is a component of the course grade. Students will design and implement an independent research project. There will be two formal presentations on the research projects. The first presentation will be an oral presentation of the results and will be given in a research symposium at the field station, and the second will be a poster presentation given during the Biology Undergraduate Research Conference. While at the station, students will conduct research and will attend field trips to observe the organisms discussed in class. Students will keep a field journal with daily notes pertaining to scientific observations and data collection.

Once students have successfully completed this course, they will be better able to: (1) plan and implement experiments in the field, (2) discuss the ongoing research conducted at the Archbold Biological Station and explain how this information can inform policy on the conservation of species, (3) construct a scientific poster, (4) participate in a scientific conference, (5) prepare and deliver oral presentations on a scientific research project, and (6) keep a field journal.

Textbook: none
Prerequisite: Consent of Instructor Required
Class size: 11

Biology 405 **Introduction to Field Biology Laboratory** (4 credits) Segraves

T 2:00-4:50 306 LSC

Course Description: Scientific methods and experimental design. Intensive field research conducted during spring break at the Archbold Biological Station in Florida. Design, implement, analyze your own research project. Travel to ecosystems discussed in class.

Active participation in discussions, exercises, and projects is strongly encouraged. Participation is a component of the course grade. There will be two formal team presentations focused on the research projects. The first will be on the proposed project, and the second will be on the results of the completed project. Details of the presentations will be discussed in class. A major component of the course will be conducted at the Archbold Biological Station in Lake Placid, Florida. Participation in the field trip for its full duration is required. Students are encouraged to use creativity while keeping a field notebook. Daily notes pertaining to scientific observations and data collection will be kept during the field trip. Field books may be either bound lab notebooks or they may be electronic versions enhanced with digital images, drawings, or sound recordings. Appropriate content and format will be discussed in class. Students will design, implement, and write-up team projects. All projects will be conducted at the field station. Details of the research project will be discussed in class.

Once students have successfully completed this course, they will be better able to: (1) describe scientific methodology and statistics, (2) plan and implement experiments in the field, (3) distinguish the major ecosystems of Florida and explain how humans have impacted each ecosystem, (4) write a scientific manuscript for publication in an ecological journal, (5) prepare and deliver oral presentations on a scientific research project, and (6) keep a scientific journal. **This course satisfies the communication skills requirement.**

Prerequisites: BIO 121, **Consent of Instructor Required**

Class size: 11

Biology 407/607 **Advanced Neuroscience** (3 credits) S. Hewett/SUNY Faculty

TTh 9:30-10:50 011 LSC

Course Description: An advanced introduction to neuroscience taught at the upper undergraduate or beginning graduate student level. The course spans the anatomy, physiology and chemistry of the nervous system, from the molecular to the cellular and systems level. Topics include: neurons and electrochemical and biophysical properties of neurons, neurochemistry, sensory and motor systems, neural plasticity and development. It is a required course for students enrolled in the Neuroscience ILM. It is strongly recommended that the student have completed both BIO 211 (Introduction to Neuroscience) and PSY 223 (Biopsychology) prior to enrolling in the course.

Textbook: Neuroscience, Purves, Augustine, Fitzpatrick, Hall. LaMantia, White, 5th edition.

Neurophysiology: A conceptual approach, Carpenter and Reddi; 5th edition.

Biology 409 **General Microbiology** (4 credits) Garza

001	Lecture: MWF	11:40-12:35	1-019 CST
002	Lab: MW	12:45-2:05	208 LSC
003	Lab: MW	2:15-3:35	208 LSC
004	Lab: MW	12:45-2:05	306 LSC

Course Description: Biology 409 is a lecture and laboratory course that introduces students to the biology of microorganisms and to microbial diseases. Pathogenic microorganisms, microbial diseases, public health issues, and immunology are all reviewed in General Microbiology. The major emphasis of the remainder of the course is bacteriology, but there are a number of lectures devoted to viruses, protozoa, algae and fungi. Topics in bacteriology include the structure of bacteria, bacterial genetics and gene regulation, and the ecology of bacteria.

The laboratory emphasizes the basic skills necessary to isolate, cultivate and identify microorganisms.

Textbooks: TBA

Frequency of Offering: Each Spring semester

Prerequisites: Core courses; plus Organic Chemistry (concurrently); Juniors & Seniors only.

Exams: Three lecture exams plus lab practical. Term paper required. Class size: 30

Biology 414/614 **Biology of Adaptive Behaviors** (3 credits) Gold

MW 3:45-5:05 105 LSC

Course Description: Behavioral adaptations based on individual experiences give animals the ability to use their pasts to solve new problems, an ability that can be obviously important to an animal's survival. This course will examine behavioral plasticity and the brain mechanisms responsible for the changes in behavior. Interestingly, there appears to be considerable conservation across much of the animal kingdom of basic biological mechanisms that mediate behavioral and brain plasticity. The class will include information that crosses several levels of analysis, from the organism, to brain systems, to neurons, to synapses, to biochemical mechanisms. The class will also consider information about memory dysfunctions as seen in aging, dementia, and retardation in humans and in laboratory model animals such as rats and mice. The format will be lecture/discussion sessions with evaluations of student performance based on participation, writing assignments, and exams.

Prior completion of at least two of the following classes is expected: Bio 327 Cell Biology, Bio 211 Intro to Neuroscience, Psy 223 Biopsychology, Bio 317 (or 217) Anatomy and Physiology II.

Biology 419	Jr/Sr Thesis Seminar	(1 credit)	Segraves/Belote
T	5:00-6:00 pm	106 LSC	

Course Description: A discussion-student presentation format course designed to introduce highly qualified students to biological research. Students present progress reports on their thesis research. The course is designed to open communication among people with interests in biological research.

Textbook: None

Prerequisites: Acceptance into a thesis program in Biology (Honors or Distinction).

Level of Presentation: Junior-Senior: must be taken all four semesters

Class size: Varies Frequency of Offering: Every semester

Biology 421	Capstone Seminar in Biotechnology	(3 credits)	Coleman
TTh	9:30-10:50	214 LSC	

Course Description: This is a seminar course for upper-level students, particularly (but not limited to) those completing a major in Biotechnology. Students will evaluate scientific papers, current news stories, and biotechnology related issues. Evaluation will occur through readings, oral presentations, written assignments, and class discussion.

Biology 422	Bioinformatics for Life Scientists	(3 credits)	Welch
001	Lecture M	12:45-1:50	156 LSC
002	Lab W	5:15-9:15	105 LSC

Course Description: Bioinformatics and how to apply it to biological research. As a lab course emphasis will be on the hands-on use of bioinformatics tools to solve relevant biological problems.

Prerequisite: BIO 326.

Biology 425	Cell & Developmental Biology Laboratory	(3 credits)	Pepling
Lec	M &	2:15-3:10	316 LSC
Lab	W	12:45-4:45	316 LSC

Course Description: Survey of current methods employed in cell and developmental biology studies, including microscopy and imaging techniques, spatial analyses of gene expression, protein expression and localization, cell fractionation, immunocytochemistry. Review of general laboratory methods, data analysis and reporting. **This course satisfies the communication skills requirement.**

Prerequisites: Bio 326 & 327; (Bio 503 or Bio 462 recommended)

Exams & Lab Reports: 4 quizzes and 4 lab reports will be required.

Class size: 24 Frequency of Offering: Every Spring semester

Biology 428 Capstone Seminar in Environmental Science (3 credits) Ritchie

T 11:00-1:30 126 LSC

Course Description: This is a seminar course for upper-level students, particularly those following the Environmental Science Curriculum (but not limited to) within a Biology or Earth Sciences major. Students will work together to critically evaluate, and propose solutions to, current environmental problems using a combination of reading, class discussion, written analyses and oral presentations. The predominant focus will be conducting independent research projects regarding important environmental problems.

Biology 443/643 Seminar in Epigenetics (3 credits) S. Hall

TTh 2:00-3:30 156 LSC

Course Description: Epigenetics describes how acquired gene expression states can be inherited through cell divisions or between generations without a change in DNA sequence. This class will cover how epigenetic mechanisms regulate gene expression for the proper development of organisms, as well as how they regulate the health and behavior of animals as a result of environmental stimuli. Seminar format including lectures, discussions, student presentations and writing assignments. Jrs. & Srs. only.

Prerequisites: BIO 326 & BIO 327

Biology 444/644 Seminar in Neurotoxicology (3 credits) J. Hewett

TTh 11:00-12:20 214 LSC

Course Description: This course will explore the effects of poisons on nervous system function through the primary literature in the field. Discussions, seminars, and writing assignments will address function of the nervous system at the molecular, cellular, and systems levels. **This course satisfies the communication skills requirement.**

Prerequisite: BIO/NEU 211 & BIO 327

Biology 450/650 Seminar in Evolutionary Genetics (3 credits) Friedman

TTh 2:00-3:20 126 LSC

Course Description: Complex traits are features whose properties are controlled by many genes and whose inheritance does not follow the simple rules of Mendelian genetics, mostly due to the role of environmental variation in affecting the phenotype. This seminar course will use recent literature and student-led discussions and presentations along with writing assignments to understand the significance of complex traits and explore current methods. Student will learn how genetic and genomic approaches are used to understand the interaction between genotype and environment in producing a phenotype. Topics will range from disease-related traits in humans to plant breeding and agriculture, with model systems ranging from mice to maize. **This course satisfies the communication skills requirement.**

Prerequisite: BIO 326 & 345

Biology 458/658	Seminar in Animal Communication	(3 credits)	Parks
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MW 2:15-3:35 214 LSC

Course Description: This course covers the general principles of animal communication systems across modalities (visual, auditory, chemical and tactile) and taxa (invertebrates to mammals). Topics include the mechanisms of signal production and reception, behavioral functions of communication signals, and the role of economics and evolution in shaping communication systems. Seminar format including lectures, discussions, student presentations and writing assignments. **This course satisfies the communication skills requirement.**

Biology 460	Research in Biology	(1-4 credits)	Faculty
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Course Description: Bio 460 is intended for Biology Majors who wish to participate in either an experimental laboratory or field research project. Bio 460 replaces the use of independent study or experience credit courses for research purposes. Student research projects will incorporate use of the scientific method, experimentation, data analysis, data presentation and interpretation, and the responsibilities of scientific integrity.

To enroll in Bio 460, the student must seek a sponsor who is willing to direct an appropriate project. Typically, the sponsor will assign the student to some aspect of an existing, larger research project. In consultation with the sponsor, the student will submit a petition with the Department Undergraduate Secretary which states the nature of the project, the expectations regarding time commitment (3 hrs. per week per credit hr.), and the means of evaluation. The student will then be given a waiver to permit enrollment.

The grading procedure for Bio 460 will generally be based on 1) the faculty member's evaluation of overall student performance, and 2) examination of required laboratory records or notebooks. Evaluation may also include 3) a report written by the student which documents the experience and results in a scientific format. Students can enroll in Bio 460 more than once, but the total credit hours applied to the Biology Major requirements cannot exceed 4 hours.

Biology 461	Experience in Biology	(0 credits)	Faculty & R. Raina
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Course Description: Internship or work experience supervised by a faculty mentor. Projects may include experimentation, data analysis, presentation, and responsibilities of scientific integrity. Development and analysis of business plans or intellectual property in **biotechnology-focused** companies, agencies or law firms is also possible.

Frequency of Offering: Each semester

Biology 464/664	Applied Biotechnology	(4 credits)	S. Raina
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001 Lec	MWF	11:40-12:35	126 LSC
002 Lab	T	12:30-3:45	206 LSC

Course Description: Biotechnology II is the second course of a two-course Biotechnology series. The first course, Biotechnology I, will be offered in the fall. These courses complement each other, but one is not required for the other.

These courses will introduce students to the molecular and genetic principles and processes involved in biotechnology. Lectures will include topics such as the genetic modification of microbial, plant, & animal cells, forensic biotechnology, and important medical, industrial, agricultural and environmental applications of biotechnology. Labs will cover many of the methods routinely used in biotechnology labs.

This course will address questions such as: What is biotechnology, how is it done, and how is it being used today? How can biotechnology impact lives of humans and other animals, plants, and the environment? What are the issues that biotechnology raises about the role of science and technology in society and ethical issues related to Biotechnology?

Prerequisites: BIO 326 & 327

Class size: 24

***This course fulfills additional laboratory experience & the communication skills requirement**

Biology 465/665	Molecular Biology Lab	(3 credits)
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001 Lecture	M &	12:45-1:40	126 LSC	Raina, S
Lab	W	12:45-4:45	206 LSC	
002 Lecture	T &	12:30-1:25	214 LSC	Raina, R
Lab	Th	12:30-4:30	206 LSC	

Course Description: Laboratory will teach basic experimental techniques including DNA isolation, restriction endonuclease cleavage of DNA, gene cloning, tissue culture techniques, construction of transgenic plants, gene expression analysis, and other techniques central to Molecular Biology. **This course satisfies the communication skills requirement.**

Prerequisites: BIO 326 & 327

Class size: 24

Frequency of Offering: Each semester

Biology 469/669	Science of Countering WMDs	(3 credits)	Silver
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MW	3:45-5:05	100 LSC
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Course Description: Scientific basis and means for countering WMDs, including biological systems. Protective measures, proven doctrines, practical questions, and problem solving. Additional work required of graduate students.

Textbook: Cirincione, J., Wolfsal, J.B., & Rajkumar, M., *Deadly Arsenals: Nuclear, Biological and Chemical Threats*, 2nd Edition (2005).

Prerequisites: Basic biology & cell biology; chemistry including organic chemistry. Physical chemistry and/or thermodynamics will be helpful topics. **Suggested:** Basic physics, including wave and ray optics.

BCM 476/676	General Biochemistry II	(3 credits)	Chan/Castañeda
MWF	9:30-10:25	105 LSC	

Course Description: Biochemistry II is a continuation of Biochemistry I covering: Mechanisms, integration and regulation of intermediary, autotrophic, nitrogen, and energy metabolism. Structure, function and metabolism of carbohydrates, lipids and proteins. The nature and function of subcellular organelles.

Textbook: Stryer: Biochemistry, 7th ed. (2012). Additional materials relating to specific topics will be provided in class.

Prerequisites: **BCM 475** (or equivalent) and one year of organic chemistry.

Exams: Four per semester. No comprehensive final; no make-ups given.

Class size: 45

Frequency of Offering: each Spring semester

Biology 490	Independent Study	(1-6 credits)	Faculty
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Course Description: Exploration of a problem, or problems, in depth. Individual independent study upon a plan submitted by the student. Admission by consent of supervising instructor(s) and the department. Proposal required.

Biology 495	Distinction Thesis in Biology	(1-3 credits)	Segraves/Belote
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Course Description: This course is for students preparing a thesis in partial fulfillment of the requirements for the Distinction in Biology Program. It normally will be taken by Distinction students in the semester prior to graduation.

Biology 499	Biology Thesis	(1-3 credits)	Faculty
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Course Description: Writing of a thesis by senior Biology majors.

Biology 501	Biology of Cancer	(3 credits)	Fondy
TTh	9:30-10:50	105 LSC	

Course Description: Clinical features: Extent, effects, epidemiology, pathology, definitions, classifications, and model systems. Basic biology of cancer cells: Growth, biochemical characteristics, progression, invasion, metastasis. Causation: Viral oncogenesis, oncogenes, suppressor genes, apoptosis. Management: Host response, immunology, and immunotherapy. **Acquisition and use of the Turning Point XR transmitter (Not the RF "clicker" or the XR device) required.**

Textbook: The Biology of Cancer, Robert A. Weinberg, 2nd edition, 2014. Garland Science. Required.

Prerequisites: Either Bio 326 or Bio 327, plus Che 275; or equiv. Class size: 108

Biology 503	Developmental Biology	(3 credits)	Pepling
TTh	11:00-12:20	011 LSC	

Course Description: We will examine the mechanisms that control animal development at the cellular and molecular levels. Topics to be covered include: patterns of early embryonic cleavage and morphogenesis, mechanisms of cellular differentiation, mechanisms of morphogenesis, pattern formation, and the genetic control of development. The course will emphasize the wide variety of experimental approaches used to study different aspects of development. Please note that this is **not** a descriptive embryology course. Rather, the goal is to provide students with an understanding of developmental mechanisms.

Classes will involve lectures, small group discussions, and general discussions. Readings will be from the textbook and the primary literature.

Textbook: S. Gilbert, Developmental Biology, 10th edition.

Prerequisites: Bio 326 & 327

Class size: 50

Frequency of Offering: Every year

GRADUATE COURSES

Biology 600/400-001	Seminar in Neurodegenerative Disease	(3 credits)	Korol
MW	2:15-3:35	156 LSC	

Course Description: This seminar course is intended to review and to stimulate discussion about the current status of our knowledge about neurodegenerative diseases, emphasizing distinctions between pathological and healthy brain aging. While the main focus is on the etiology, neurobiology, and emergent symptoms of the diseases, broader biological, sociological, and historical perspectives are woven into the material. Seminar format including lectures, discussions, student presentations, and a variety of written assignments.

Biology 600/400-002	Nervous System Insult & Repair/Recovery Strategies	(3 credits)	Shreckengost
TTh	2:00-3:20	214 LSC	

Course Description: From the NFL's \$765 million settlement over concussion-related brain injuries to botulinum toxin type A (Botox®) injections for treatment of uncontrollable muscle spasms resulting from nervous system injury, we'll examine the changes that occur in the nervous system following injury and how we are attempting to treat those injuries. Students will gain an understanding of how our nervous systems and bodies respond to injury. We will explore both the immediate physiological effects of nervous system trauma and the long-term consequences of sustaining brain or spinal cord damage. Our bodies respond to injury in a number of ways. Particularly in the nervous system, some of our adaptive responses to injury can go awry, causing more harm than good. We will discuss the strategies our bodies employ in an attempt to repair damaged tissue. Finally, we'll look at historical and contemporary clinical interventions for early treatment of brain damage and rehabilitation tools assist individual's recovery from injury.

Biology 600/400-003 **Advanced Field Biology** (2 credits) Segraves/Althoff

T 2:00-4:00 439 LSC

Course Description: Scientific methods and experimental design. Intensive field research conducted during spring break at the Archbold Biological Station in Florida. Design, implement, analyze a research project. Intensive reading and discussion of primary literature on projects conducted at the field station.

Active participation in discussion and projects is strongly encouraged. Participation is a component of the course grade. Students will design and implement an independent research project. There will be two formal presentations on the research projects. The first presentation will be an oral presentation of the results and will be given in a research symposium at the field station, and the second will be a poster presentation given during the Biology Undergraduate Research Conference. While at the station, students will conduct research and will attend field trips to observe the organisms discussed in class. Students will keep a field journal with daily notes pertaining to scientific observations and data collection.

Once students have successfully completed this course, they will be better able to: (1) plan and implement experiments in the field, (2) discuss the ongoing research conducted at the Archbold Biological Station and explain how this information can inform policy on the conservation of species, (3) construct a scientific poster, (4) participate in a scientific conference, (5) prepare and deliver oral presentations on a scientific research project, and (6) keep a field journal.

Textbook: none
Prerequisite: Consent of Instructor Required
Class size: 11

Biology 607/407 **Advanced Neuroscience** (3 credits) S. Hewett/J. Hewett/SUNY Faculty

TTh 9:30-10:50 011 LSC

Course Description: An advanced introduction to neuroscience taught at the upper undergraduate or beginning graduate student level. The course spans the anatomy, physiology and chemistry of the nervous system, from the molecular, to the cellular and systems level. Topics include: neurons and electrochemical and biophysical properties of neurons, neurochemistry, sensory and motor systems, neural plasticity and development.

Textbook: Neuroscience, Purves, Augustine, Fitzpatrick, Hall. LaMantia, White, 5th edition.
Neurophysiology: A conceptual approach, Carpenter and Reddi; 5th edition.

Biology 610 **Graduate Research Laboratory** (1-3 credits) Faculty

Course Description: Work in research laboratories to acquire skills and techniques. May be repeated for a maximum of 6 credits.

Biology 614/414	Biology of Adaptive Behaviors	(3 credits)	Gold
TTh	2:00-3:20	105 LSC	

Course Description: Behavioral adaptations based on individual experiences give animals the ability to use their pasts to solve new problems, an ability that can be obviously important to an animal's survival. This course will examine behavioral plasticity and the brain mechanisms responsible for the changes in behavior. Interestingly, there appears to be considerable conservation across much of the animal kingdom of basic biological mechanisms that mediate behavioral and brain plasticity. The class will include information that crosses several levels of analysis, from the organism, to brain systems, to neurons, to synapses, to biochemical mechanisms. The class will also consider information about memory dysfunctions as seen in aging, dementia, and retardation in humans and in laboratory model animals such as rats and mice. The format will be lecture/discussion sessions with evaluations of student performance based on participation, writing assignments, and exams.

There are no specific prerequisites for this course. However, prior completion of at least one of the following classes listed is expected: Bio 327 Cell Biology, Bio 326 Genetics, Bio 211 Intro to Neuroscience, Psy 223 Biopsychology, Bio 355 General Physiology.

Bio/Che/Phy 638	Open Problems in Soft Interfaces	(3 credits)	Mather
MW	5:15-6:35	414 Bowne	

Course Description: A seminar on the critical analysis of the current literature on interfaces, whereby we will define the frontiers of interface research by identifying unsolved problems. Small interdisciplinary groups will scour online databases for "hot" articles or research groups associated with a particular research topic (e.g., biomaterial interfaces relevant to a particular disease or injury; fundamental interface problems in soft matter physics; techniques for patterning surfaces; mechanisms for bacterial biofilm control; novel mechanisms for drug delivery) ultimately selecting a single paper to be pitched to the entire class for in-depth consideration by all. Following this selection, several students will lead the discussion of the article. The class will critically analyze the paper and end with updating a developing list of unsolved problems. This course goes beyond traditional seminar or paper classes by developing appreciation for the process of defining a research project in the context of friendly, interdisciplinary debate that fosters improved scientific communication. Near the end of the course teams will be asked to prepare a concrete research proposal to be refereed by the class. The diverse composition of the teams will challenge the students to find ways of taking advantage of their different expertise and will provide a taste of team grant-writing. Offered every year in the Spring semester.

Biology 643/443	Seminar in Epigenetics	(3 credits)	Hall
TTh	2:00-3:20	156 LSC	

Course Description: Epigenetics describes how acquired gene expression states can be inherited through cell divisions or between generations without a change in DNA sequence. This class will cover how epigenetic mechanisms regulate gene expression for the proper development of organisms, as well as how they regulate the health and behavior of animals as a result of environmental stimuli. Seminar format including lectures, discussions, student presentations and writing assignments.

Biology 644/444	Seminar in Neurotoxicology	(3 credits)	J. Hewett
	TTh	11:00-12:20	214 LSC

Course Description: This course will explore the effects of poisons on nervous system function through the primary literature in the field. Discussions, seminars, and writing assignments will address function of the nervous system at the molecular, cellular, and systems levels.

Biology 650/450	Seminar in Evolutionary Genetics	(3 credits)	Friedman
	TTh	2:00-3:20	126 LSC

Course Description: Complex traits are features whose properties are controlled by many genes and whose inheritance does not follow the simple rules of Mendelian genetics, mostly due to the role of environmental variation in affecting the phenotype. This seminar course will use recent literature and student-led discussions and presentations along with writing assignments to understand the significance of complex traits and explore current methods. Student will learn how genetic and genomic approaches are used to understand the interaction between genotype and environment in producing a phenotype. Topics will range from disease-related traits in humans to plant breeding and agriculture, with model systems ranging from mice to maize.

Biology 658/458	Seminar in Animal Communication	(3 credits)	Parks
	MW	2:15-3:35	214 LSC

Course Description: This course covers the general principles of animal communication systems across modalities (visual, auditory, chemical and tactile) and taxa (invertebrates to mammals). Topics include the mechanisms of signal production and reception, behavioral functions of communication signals, and the role of economics and evolution in shaping communication systems. Seminar format including lectures, discussions, student presentations and writing assignments.

Biology 664/464	Applied Biotechnology	(4 credits)	S. Raina
001 Lec	MWF	11:40-12:35	126 LSC
002 Lab	T	12:30-3:45	206 LSC

Course Description: Biotechnology II is the second course of a two-course Biotechnology series. The first course, Biotechnology I, will be offered in the fall. These courses complement each other, but one is not required for the other.

These courses will introduce students to the molecular and genetic principles and processes involved in biotechnology. Lectures will include topics such as the genetic modification of microbial, plant, & animal cells, forensic biotechnology, and important medical, industrial, agricultural and environmental applications of biotechnology. Labs will cover many of the methods routinely used in biotechnology labs.

This course will address questions such as: What is biotechnology, how is it done, and how is it being used today? How can biotechnology impact lives of humans and other animals, plants, and the environment? What are the issues that biotechnology raises about the role of science and technology in society and ethical issues related to Biotechnology?

Biology 665/465		Molecular Biology Lab	(3 credits)
001 Lecture	M &	12:45-1:40	126 LSC
Lab	W	12:45-4:45	206 LSC
002 Lecture	T &	12:30-1:25	214 LSC
Lab	Th	12:30-4:30	206 LSC

Course Description: Laboratory will teach basic experimental techniques including DNA isolation, restriction endonuclease cleavage of DNA, gene cloning, tissue culture techniques, construction of transgenic plants, gene expression analysis, and other techniques central to Molecular Biology. This course meets the communications skills requirement.

Biology 669/469	Science of Countering WMDs	(3 credits)	Silver
	MW	3:45-5:05	100 LSC

Course Description: Scientific basis and means for countering WMDs, including biological systems. Protective measures, proven doctrines, practical questions, and problem solving. Additional work required of graduate students.

Textbook: Cirincione, J., Wolfsal, J.B., & Rajkumar, M., *Deadly Arsenals: Nuclear, Biological and Chemical Threats*, 2nd Edition (2005).

Prerequisites: Basic biology & cell biology; chemistry including organic chemistry. Physical chemistry and/or thermodynamics will be helpful topics. Suggested: Basic physics, including wave and ray optics.

BCM 676/476	General Biochemistry II	(3 credits)	Chan/Castañeda
	MWF	9:30-10:25	105 LSC

Course Description: Biochemistry II is a continuation of Biochemistry I covering: Mechanisms, integration and regulation of intermediary, autotrophic, nitrogen, and energy metabolism. Structure, function and metabolism of carbohydrates, lipids and proteins. The nature and function of subcellular organelles.

Text: Stryer: Biochemistry, 7th ed. (2012). Additional materials relating to specific topics will be provided in class.

Prerequisites: **BCM 475** (or equivalent) and one year of organic chemistry.

Exams: Four per semester. No comprehensive final; no make-ups given.

Class size: 45

Frequency of Offering: each Spring semester

Biology 688	Biological Literature	(1-3 credits)	Faculty
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Course Description: This number is used for courses that are essentially tutorials in which a student reviews a specific area in conjunction with a faculty member.

Frequency of Offering: every Semester

Biology 690	Independent Study	(1-6 credits)	Faculty
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Course Description: This number is used for special projects during which graduate students conduct laboratory or field research that is not related to their thesis or dissertation research. In general, a student should not register for Bio 690 supervised by his or her advisor.

Prerequisites: A proposal for Independent Study must be completed (in which the project and procedures for evaluation are described), signed by the supervising professor and taken to 110 LSC to obtain a waiver prior to registration.

Frequency of Offering: every Semester

Biology 705	Graduate Research Seminars	(0-1 credit)	MacDonald
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T	3:30-4:25	106 LSC
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Course Description: Students present their thesis or dissertation research and critically evaluate the research presentations of other students. Offered every semester.

Frequency of Offering: every Semester

Biology 997	Masters Thesis	(0-6 credits)
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Biology 999	Dissertation	(0-15 credits)
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GRD 998	Degree in Progress	(0 credits)
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Revised 10/15/15