

BIOLOGY DEPARTMENT

COURSE DESCRIPTIONS - SPRING 2018

Biology 123 **General Biology II** (3 credits) Winterton

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-13 978-1-323-14655-2.

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) Winterton

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 Special Topics in Research (2 credits) Schmid

001 M 9:30-11:30
002 M 3:45-5:45 156 LSC

Description: This course will prepare students to engage with scientific research. In a format similar to upper-division and graduate level seminars, first and second year students will learn how to read and understand scientific papers, including those reporting on research performed in labs at Syracuse University. Students will have the opportunity to interact with members of laboratories on campus and explore possibilities for undergraduate research.

Biology 211 **Introduction to Neuroscience** (3 credits) Jones

MW 12:45-2:05 011 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 will be taught using Team Based Learning and students will spend most of class time working in teams to solve case study problems as well as engage in other team learning activities that promote deeper understanding of basic neuroscience concepts.

Prerequisites: High school biology and chemistry

Class size: 40

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, 11th Ed.

Prerequisites: Bio 121-123 or equivalent

Examinations: Midterm & Final, plus weekly quizzes

Class size: 96

Frequency of Offering: Spring semesters

Biology 223 **Peer Led Team Learning II** (2 credits) Snyder

001 T 11:00-11:55 229 Lyman
002 Th 9:30-10:25 021 Hinds

Course Description: A 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 305	Integrative Biology Lab	(3 credits)	Lewis/Maine/Ritchie
001 Lecture	M	10:35-12:05	001 LSC
002 Lab	T	12:30-4:30	146 LSC
003 Lab	T	1:00-5:00	148 LSC
004 Lab	W	12:45-4:45	146 LSC
005 Lab	W	1:15-5:15	148 LSC
006 Lab	Th	12:30-4:30	146 LSC
007 Lab	Th	1:00-5:00	148 LSC
008 Lab	F	12:45-4:45	146 LSC
009 Lab	F	1:15-5:15	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
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, 11th 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)	Phillips
TTh	11:00-12:20	HBC Gifford Aud	

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) TBA

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

BIO/PHI 396/REL 359 **Stem Cells & Society** (3 credits) Erdman, Paakkunainen

MWF 10:35-11:30 114 HL

Course Description: The science of stem cells and the philosophical, religious and legal complexities surrounding the research and use of stem cell technologies.

Biology 400/600-001 Sem: Experimental Designs & Interpretations in Biology (3 credits) Gold

W 2:15-5:05 156 LSC

Course Description: This seminar will discuss how historical ideas and data, even when no longer believed to be correct, shape the way current research is performed. The course will include multiple presentations and papers.

Jrs. & Srs. only; others by permission. **This course satisfies the communication skills requirement.** Meets with BIO 600-001.

Class size: 15

Biology 400/600-002 **Seminar in Neurodegenerative Disease** (3 credits) Korol

T 2:00-4:45 228 Lyman

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. **This course satisfies the communication skills requirement.**

Class size: 15

Bio 400/600-004 Pharmaceuticals & Cells: The Good, the Bad & the Unknown(3 credits) Phillips

MWF 10:35-11:30 214 LSC

Course Description: How do drugs affect cells, and why should we care? Students will be introduced to a variety of signal transduction pathways and their function in the regulation of cellular processes. To demonstrate applications of signal transduction in biotechnology, this course focuses on signaling cascades targeted in the treatment (or potential treatment) of medical conditions including cancer, asthma, depression, drug addiction, neurodegeneration, cardiovascular disease and developmental abnormalities. Additional work required of graduate students. **This course satisfies the communication skills requirement.**

Biology/NEU 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

TTh 2:00-3:20 011 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.

Class size: 49

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 416/616 **Biology of Aging** (3 credits) Korol

MW 3:45-5:05 011 LSC

Course Description: Aging is an intrinsic property of all living organisms. However, the way in which aging manifests itself varies quite broadly within and between species. To understand the complex nature of aging and its place in the life cycle, this course will review topics related to the biology of aging across many levels of analysis from molecule to cell to system to organism. Classic and contemporary aging research will be evaluated from a variety of experimental models. In the process we will dispel some of the myths of aging even as they relate to basic scientific findings and evaluate how the conventional wisdom on aging issues obtained through the media and other public sources reflects and influences basic research findings.

Organization of the course includes lectures, discussion, quizzes, and a variety of written assignments. While there are no specific prerequisites, completion of at least one of the following classes is highly recommended: Bio 327 Cell Biology, Bio 326 Genetics, Bio 355 General Physiology.

Biology 419 **Jr/Sr Thesis Seminar** (1 credit) TBA

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. **Sr. Biotechnology Majors only; others by consent of instructor. This course satisfies the communication skills requirement.**

Class size: 15

Biology 425 Cell & Developmental Biology Laboratory (3 credits) Pepling

001 Lec T 12:30-1:25 316 LSC
002 Lab Th 12:30-4:30 316 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 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. **This course satisfies the communication skills requirement.**

Biology 441/641 Seminar in Infectious Diseases (3 credits) Garza

TTh 11:00-12:20 156 LSC

Course Description: This is a seminar that focuses on human diseases caused by infectious agents such as viruses and bacteria. Research on infectious diseases, the organisms that cause infectious diseases and disease treatments will be presented and discussed. The course also includes lectures related to the discussed material and disease case studies when possible. Additional work is required of graduate students. **This course satisfies the communication skills requirement.**

Class size: 15

Biology 443/643 **Seminar in Epigenetics** (3 credits) S. 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. Jrs. & Srs. Only. **This course satisfies the communication skills requirement.**

Prerequisites: BIO 326 & BIO 327

Class size: 15

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

Class size: 15

Biology 456/656 **Seminar in Human Disease Genomics** (3 credits) Dorus

TTh 9:30-10:50 156 LSC

Course Description: Introduces students to influential genomic studies relating to human evolution and the etiology & epidemiology of human disease. Recent insights into the genetic basis of human adaptation & its potential relevance to disease predisposition will be discussed. Additional work required of graduate students. **This course satisfies the communication skills requirement.** Meets with BIO 656

Class size: 15

BIO/BCM 460 **Research in Biology/Biochemistry** (1-4 credits) Faculty

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 or BCM 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 form 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

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

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)

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/Forensics 469/669 **Science of Countering WMDs** (3 credits) Silver

MW 3:45-5:05 201 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 476 **General Biochemistry II** (3 credits) Korendovych

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: Three mid-terms and a comprehensive final; no make-ups given.

Class size: 45

Frequency of Offering: each Spring semester

Biology 490 **Independent Study** (1-6 credits) Faculty

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)

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. **Departmental consent required.**

Biology 499 **Honors Capstone Project** (1-3 credits) Faculty

Course Description: Completion of an Honors capstone project under the supervision of a faculty member.

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 QT or QT2 transmitter (Not the RF 'clicker') is required.**

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

Prerequisites: Bio 326 and Bio 327. Class size: 108

Biology 503 **Developmental Biology** (3 credits) Maine/MacDonald

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*, 11th edition.

Prerequisites: Bio 326 & 327

Class size: 49

Frequency of Offering: Every year

Biology 565 **Cellular Physiology** (3 credits) Sweet

TTh 2:00-3:20 214 LSC

Description: Designed to coordinate with BIO 462/642, Molecular Genetics, this course will take a more in-depth look at extranuclear cell functions. Emphasis will be placed on animal cell physiology. Topics will include: cell membranes, cytoskeleton, organelle structure and function, cell adhesion and the extracellular matrix, intercellular signaling, signal transduction and specialized sensory cells.

Textbook: H. Lodish et al., *Molecular Cell Biology*, (7th ed.), 2012, Freeman & Co.

Prerequisites: 2 years of biology and organic chemistry

Grading: Class participation, 3 exams & a primary resource-based term paper

Class size: 12

GRADUATE COURSES

Biology 600/400-001 Sem: Experimental Designs & Interpretations in Biology (3 credits) Gold

W 2:15-5:05 156 LSC

Course Description: This seminar will discuss how historical ideas and data, even when no longer believed to be correct, shape the way current research is performed. The course will include multiple presentations and papers.
Meets with BIO 400-001

Class size: 15

Biology 600/400-002 Seminar in Neurodegenerative Disease (3 credits) Korol

W 2:15-5:05 156 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 600-003 Climate Change: Science, Perception & Policy (1 - 3 credits) Frank

Th 2:00-4:30 350 Dineen

Course Description: Climate change (global warming) is rapidly becoming one of the most pressing issues of the twenty-first century. This course introduces students to the challenges posed by climate change through a unique multidisciplinary exploration of the scientific, economic, policy, communicative, and even philosophical dimensions of the issue. The course will cover topics such as the current state of scientific knowledge about climate change, the role of the media in shaping public opinion on the issue, competing discourses of climate change, risk and uncertainty in decision-making, costs and benefits of different types of policies, the Kyoto protocol and other policy initiatives, actions being taken to address the issue, and the ethical dimensions of the choices facing humanity. Faculty from SU and ESF in law, economics/public administration, earth science, and environmental studies will co-teach this course and bring to students a unique dialog that crosses traditional disciplinary boundaries. Moreover, emphasis will be placed on drawing out the general lessons obtained from a multidisciplinary approach to climate change: many of the insights will be applicable to other complex, highly technical environmental problems. This course is intended to bring together students from a diverse range of backgrounds and does not have specific prerequisites.

Meets with PPA 730 & LAW 891

Biology 600/400-004 Pharmaceuticals & Cells: The Good, the Bad & the Unknown (3 credits)
Phillips

MWF 10:35-11:30 214 LSC

Course Description: How do drugs affect cells, and why should we care? Students will be introduced to a variety of signal transduction pathways and their function in the regulation of cellular processes. To demonstrate applications of signal transduction in biotechnology, this course focuses on signaling cascades targeted in the treatment (or potential treatment) of medical conditions including cancer, asthma, depression, drug addiction, neurodegeneration, cardiovascular disease and developmental abnormalities. Additional work required of graduate students.

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 2:00-3:20 011 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.

Class size: 49

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 616/416 **Biology of Aging** (3 credits) Korol

MW 3:45-5:05 011 LSC

Course Description: Aging is an intrinsic property of all living organisms. However, the way in which aging manifests itself varies quite broadly within and between species. To understand the complex nature of aging and its place in the life cycle, this course will review topics related to the biology of aging across many levels of analysis from molecule to cell to system to organism. Classic and contemporary aging research will be evaluated from a variety of experimental models. In the process we will dispel some of the myths of aging even as they relate to basic scientific findings and evaluate how the conventional wisdom on aging issues obtained through the media and other public sources reflects and influences basic research findings.

Organization of the course includes lectures, discussion, quizzes, and a variety of written assignments. While there are no specific prerequisites, completion of at least one of the following classes is highly recommended: Bio 327 Cell Biology, Bio 326 Genetics, Bio 355 General Physiology.

Biology 641/441 **Seminar in Infectious Diseases** (3 credits) Garza

Course Description: This is a seminar that focuses on human diseases caused by infectious agents such as viruses and bacteria. Research on infectious diseases, the organisms that cause infectious diseases and disease treatments will be presented and discussed. The course also includes lectures related to the discussed material and disease case studies when possible. Additional work is required of graduate students. Additional work required of graduate students.

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 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 656/456 Seminar in Human Disease Genomics (3 credits) Dorus

TTh 9:30-10:50 !%^ LSC

Course Description: Introduces students to influential genomic studies of the etiology & epidemiology of human disease. Recent insights into the genetic basis of human adaptation & its potential relevance to disease predisposition will be discussed. Additional work required of graduate students. Meets with BIO 456.

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 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 meets the communications skills requirement.

Biology/Forensics 669/469 Science of Countering WMDs (3 credits) Silver

MW 3:45-5:05 201 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.

Biology 688 **Biological Literature** (1-3 credits) Faculty

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

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) J. Hewett

T 3:30-4:25 106 LSC

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 797 **Seminar: Topics in Evolution** (0-2 credits) Pitnick
TBA TBA TBA

Course Description: Sexual selection and conflict, parental care, social evolution, speciation, morphological evolution. Critically evaluate and discuss recent historical and classical literature on the given topics.

Class size: 10

Biology 997 **Masters Thesis** (0-6 credits)

Biology 999 **Dissertation** (0-15 credits)

GRD 998 **Degree in Progress** (0 credits)

Revised 10/13/17