

BIOLOGY DEPARTMENT
COURSE DESCRIPTIONS
FALL 2016
1171

<u>Biology 105</u>	Technology Inspired by Nature	(3 credits)	Althoff
	MW 2:15-3:35	001 LSC	

Description: Explore how the biological world may provide solutions for many of the technological problems faced by society. We will examine the ways that organisms function and interact, and apply this knowledge towards understanding and creating technological advances. The course will be loosely organized around topics such as flight, communication and networking, swarm intelligence, computing, agriculture, chemical engineering, energy production, and medicine. Students will develop an appreciation of biology, how it is studied, and its importance to human society. This is a lecture course.

Textbook: none
Class size: 200

Prerequisites: none
Frequency of Offering: Every other Fall semester

<u>Biology 121</u>	General Biology I	(4 credits)	Wiles & Staff
---------------------------	-------------------	-------------	---------------

Lecture - Monday AND Wednesday 10:35-11:30 am OR 12:45-1:40 pm Giff Aud
 Lab - One 3-hour section per week (simultaneous lab and discussion)

Description: Required entry-level course for biology majors and the first of a two-course sequence comprising a survey of essential biological concepts ranging from the molecular level to global ecology. Two lectures and 1 combined lab/recitation section per week. Students in Biology 121 will explore the nature of science and the diversity of organisms within a framework of major themes including the flow and regulation of energy and information within living systems, and the central and unifying concept of evolution. Efforts will be made to relate key concepts to model organisms for research and practical examples such as diseases and environmental issues.

Required Materials:

Textbook: Campbell Biology General Biology I and II, Custom Edition for Syracuse University, available at SU bookstore only.

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

Class size: 800 limit **Frequency of Offering:** Each fall semester

<u>Biology 200</u>	Peer Led Team Learning	(2 credits)	Snyder
	001 M 11:40-12:35 3-216 CST		
	002 T 5:00-5:55 126 LSC		

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 211 Introduction to Neuroscience (3 credits) Shreckengost

MW12:45-2:05 105 LSC

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: 100

Biology 216 Anatomy and Physiology I (4 credits) Sweet

Lecture:	001	MW12:45-2:05	001 LSC
Labs:	002	W 8:00-10:00	308 LSC
	003	W 10:35-12:35	308 LSC
	004	T 8:00-10:00	308 LSC
	008	T 10:20-12:20	308 LSC
Recitations:	010	W 3:45-5:45	308 LSC
	005	Th 5:00-6:20	300 LSC
	006	F 12:45-2:05	300 LSC
	007	M 8:00-9:20	300 LSC
	009	Th 5:00-6:20	011 LSC
	011	F 12:45-2:05	214 LSC

Description: An introduction to the structure and function of human tissues, organs and systems. The course is designed with an emphasis on physiological functions and the role of anatomical form in these processes. Topics include skeletal & muscle structure & function; neural & integumentary systems. Exercises will include laboratory demonstrations of organ/system models, histology, interactive computer experiments and non-invasive experiments on human subjects.

Textbook: VanPutte, Regan & Russo, Seeley’s Anatomy & Physiology (10th ed.)

Prerequisites: Bio 121-123 or equivalent

Grading: Weekly laboratory reports, Midterm & Final, plus weekly quizzes

Class size: 120 Frequency of Offering: Fall semesters

BIO 316 Anatomy & Physiology I for Biology Majors (4 credits) Sweet

Lecture	001	MW 12:45-2:05	001 LSC
Laboratory	002	F 12:45-3:45	308 LSC
Laboratory	003	F 8:25-11:25	308 LSC

Description: Anatomy and Physiology I, for Biology and Biochemistry majors only. The course incorporates a three-credit laboratory that can be applied to the Biology major, unlike BIO 216. A combined laboratory and recitation section will meet on Fridays. Laboratory exercises include a cat dissection, microscopy, virtual physiology experiments and other activities appropriate for a 300-level course.

Textbooks: VanPutte, Regan & Russo, Seeley’s Anatomy & Physiology (10th ed.), McGraw Hill.

Rust, A Guide to Anatomy & Physiology Lab (2nd ed.), Southwest Educational Enterprises.

Sebastiani & Fishbeck, Mammalian Anatomy the Cat (2nd ed.) Morton Publishing Company.

Prerequisites: Bio 121-123 or equivalent

Grading: Weekly quizzes and midterm and final exams. Understanding of laboratory material will be evaluated with 2-3 laboratory practicals. Class size: 48 Frequency of Offering: Fall semesters

<u>Biology 327</u>	Cell Biology	(3 credits)	Erdman/Silver
TTh	11:00-12:20	Gifford Auditorium	

Description: Cell structure, molecular biology of eukaryotic cells, cytoskeletal organization and function, cell division cycle, membrane structure and function, cell-cell interactions, cell differentiation and regulation.

Textbook: *Essential Cell Biology*, 4th ed., by Alberts et al. (Garland Publishing, 2013); Turning Technologies Response Card "Clicker".

Prerequisites: BIO 121, CHE 106. Class size: 350 Frequency of Offering: Every Fall semester

<u>Biology 345</u>	Ecology & Evolution	(3 credits)	Fridley/Friedman/Frank
TTh	9:30-10:50	001 LSC	

Description: A broad survey course designed to introduce the student to the topics of ecology and evolutionary biology. The lectures will cover evolutionary processes, natural selection and adaptation, phylogenetics, population ecology, community ecology and ecosystems. Ecology and Evolution is part of the required core curriculum of the Biology Department.

Textbooks: *Evolution: Making Sense of Life*, by Zimmer and Emlen (Roberts & Co. Publishing);
SimUText Ecology, custom text, (SimUText publishing)

Prerequisites: 121/123 or equivalent

Class size: 239

Exams: Four

Frequency of Offering: Fall semesters

<u>Biology 355</u>	General Physiology	(3 credits)	Tupper
TTh	11:00-12:20	105 LSC	

Description: A lecture course on the physiology of higher animals including circulation, regulation of body fluids, nervous system, sensory systems, muscle, cardiac function and digestion.

Textbook: *Human Physiology*, Vander, Sherman & Luciano, 13th Edition, 2012.

Prerequisites: Bio 121/123; Che 106, 107

Class Size: 108

Frequency of Offering: Each semester

<u>Biology 360</u>	Biology Laboratory Assistant	(1 credit)	Wiles
---------------------------	------------------------------	------------	-------

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.

M 3:45-4:40 134 LSC

Textbook: None

Prerequisites: Permission of instructor in advance.

Examinations: None

Grade: A-F based upon participation & performance

Frequency of Offering: Each semester

Biology 400-001/600-001 Seminar in Epigenetics of Human Health & Disease (3 credits) MacDonald
 MW 3:45-5:05 214 LSC

Description: The epigenome encodes information above and beyond the sequence of DNA, acting at the interface between genes and the environment. This course will explore how epigenetic modifications influence our health and modify our risk of disease, including neurodevelopmental and neurodegenerative disorders, heart disease, and obesity. Seminar format including lectures, discussions, student presentations, and various writing assignments.

Prereqs: BIO 326 & 327; BIO 443 or 462 recommended. Jrs. & Srs. Only.
Class size: 15

Biology 400-002 Biology of Marine Mammals (3 credits) Parks
 MW 2:15-3:35 214 LSC

Description: Introduction to the biology of cetaceans, pinnipeds, sirenians and marine otters, including the evolution, ecology, behavior and conservation of these organisms.

Prerequisite: BIO 345 Class size: 30 Jrs. & Srs. Only

Biology 400/600-003 Seminar in Cell Biology & the Cytoskeleton (3 credits) Langford
 TTh 2:00-3:20 126 LSC

Description: Seminar course will cover the cytoskeleton in health and disease. Topics will include human skin cell responses to fungal infections such as candidiasis and brain diseases that affect learning and memory. The primary focus will be on the actin cytoskeleton and the molecular motors of the myosin family. Advances in imaging techniques that allow real-time observation of cell migration and dynamics of the actin cytoskeleton will be presented. Topics will include cell migration, synaptic plasticity and axonal transport. Seminar format including lectures, discussions of current papers, student presentations, and various writing assignments.

Class size: 10 Jrs. & Srs. Only

Biology 400-004,005/600-004,005 Global Change Ecology Lab (3 credits) Frank/Fridley
 -004 Lec M 12:45-1:40 306 LSC
 -005 Lab W 12:45-4:45 306 LSC

Description: In this course students will learn to measure plant, soil, and ecosystem properties associated with global warming, the spread of invasive species, deforestation, and environmental pollution. Lab activities focus on monitoring trees and shrubs in the campus Climate Change Garden, including measurements of photosynthesis and leaf behavior, root growth, and associated animal and microbial relations. Students will also develop models of forest growth by collecting data in natural forest stands in nearby Green Lakes State Park. Students will develop an understanding of the scientific method by conducting group projects that involve data analysis and class presentations.

Prerequisite: BIO 345 Jrs. & Srs. Only

Biology 417 Animal Behavior & Evolutionary Biology (3 credits) Pitnick

001 Lecture	T	11:00-12:20	306 LSC
002 Lab	T	12:30-4:30	306 LSC

Description: This lecture and laboratory course focuses on understanding the process of evolution by natural and sexual selection with a special emphasis on the evolution of adaptive animal behavior. Topics we will cover may include: natural selection, behavior genetics, mechanisms of behavior, communication, predator-prey interactions, sexual reproduction, mating systems, and social behavior. Laboratory exercises will provide direct experience for some of these concepts. In addition, students are required to develop, conduct and present the results of an independent research project. Throughout the course we will consider how the study of evolution and animal behavior can help us understand human behavior. This course is an upper-level biology lab course appropriate for junior and senior biology majors, and will count towards the "laboratory courses" and "communication skills courses" required for biology majors.

Textbook: None

Exams: None

Coursework: Participation in group discussions and in field and laboratory research projects, development and execution of independent research project, writing a grant proposal and four scientific manuscripts, and oral presentations of research plans and results from independent research project.

Prerequisites: Bio 345 or permission of instructor

Class size: 18

Biology 419 Jr/Sr Thesis Seminar (1 credit) Belote/Segraves

T	5:00-6:00	106 LSC
---	-----------	---------

Description: Seminar course with student presentations on their research projects. Open to all science students planning to write a biology-related thesis on their research project. Required of students in the Distinction in Biology and Biotechnology Programs. May be repeated for credit up to four times.

Level of Presentation: Junior-Senior. Class size: Varies Frequency of Offering: Every semester

Biology 422 Bioinformatics for Life Scientists (3 credits) Welch

001	Lecture	M	12:45-1:40	214 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 435 Genetics Laboratory (3 credits) Hall

001 Lec	T	2:00-3:20	208 LSC
002 Lab	Th	2:00-5:00	208 LSC

Description: Students will gain experience in genetic methods and analyses using various model organisms, such as budding yeast (*Saccharomyces cerevisiae*), fruit flies (*Drosophila melanogaster*), nematodes (*Caenorhabditis elegans*), and mustard plants (*Arabidopsis thaliana*). Experiments will include gene mapping, phenotypic analysis, transformation, complementation, population genetics, and an introduction to molecular biology.

Prerequisites: BIO 326 and 327

Textbook: None required, but a general genetics textbook would be a useful reference.

Class size: 24

Biology 442/642 Model Organism Genetics (3 credits) Belote
TTh 12:30-1:50 214 LSC

Description: The shared evolutionary history of all life makes it possible to use genetically tractable organisms to study fundamental aspects of cell and developmental biology, as well as to explore the molecular basis of many human diseases. This course will focus on six of the most common model genetic systems (yeast, worms, fruit flies, zebrafish, mouse and mustard weed), examining the unique genetic features of each, and how they are being used to investigate such topics as animal and plant development, cell growth and cancer, neurological disease, behavior, and aging. The format of this seminar course includes lectures, student presentations, discussions, quizzes and writing assignments.

Prerequisites: BIO 326 and BIO 327

Biology 447 Basic Immunology (3 credits) Fondy
TTh 2:00-3:20 105 LSC

Description: Humoral and cell-mediated immunity. Antigens and T-cell receptor structure, function, and diversity. Cells and tissues of the immune system. Cytokines, cytokine receptors, and immune regulation. Major histocompatibility loci, tolerance, and cell-mediated cytotoxicity. Vaccines.

Textbook: *Kuby Immunology*, 7th Ed., Owen, Punt, Stranford. Freeman & Co.

Examinations: Three 1-hour exams

Prerequisites: Bio 326 and 327 Class size: 108

Biology 459/659 Plants & People (3 credits) Coleman
TTh 12:30-1:50 011 LSC

Description: Plants are critical for sustaining life on Earth. They sequester carbon dioxide and convert solar energy to forms that can be used, acting as key agents against climate change. In addition they are a key source of food, clothing and fuel. This course will focus on how plants function individually, and as they interact with their environment. The course goals are to gain an understanding of basic plant biology at the molecular level, to understand the role of plants in the environment and in society, and to use this information to make informed opinions and decisions about current environmental issues including air pollution, land conservation, climate change and genetic modification. As plants are a model system for molecular genetics, cell biology and biochemistry research, this class is an excellent elective for students interested in these areas.

Prerequisites: Bio 121 & 123; or AP equivalent Class size: 40

Biology 460 Research in Biology (1-4 credits) Faculty

Description: Bio 460 is intended for Biology Majors who wish to participate in either a laboratory or field research project. **Bio 460 replaces 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 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 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.

Frequency of Offering: Each semester

Biology 461 Experience in Biology (0 credits) Faculty & R. Raina

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. Biotechnology Majors only.

Frequency of Offering: Each semester

Biology 462/662 Molecular Genetics (3 credits) Dorus
MWF 10:35-11:30 011 LSC

Description: This course will provide a broad introduction to the study of gene and genome function, including transcription, translation, DNA replication, recombination and prokaryotic and eukaryotic mechanisms of inheritance. Gene and genome architecture, mechanisms of gene regulation, epigenetics and the molecular basis of human disease will be discussed. An emphasis will be placed on the application of high-throughput genomic, transcriptomic and epigenomic approaches to systems level analyses of genome biology.

Textbook: *Genetics: a molecular approach*

Prerequisites: BIO 326 and BIO 327

Class size: 40

Biology 463/663 Molecular Biotechnology (4 credits; 3 of these count towards lab credit) S. Raina
001 Lec MWF 11:40-12:35 011 LSC
002 Lab Th 12:30-3:45 206 LSC

Description: Molecular Biotechnology is the first course of a two-course Biotechnology series. The second course, Applied Biotechnology, will be offered in the spring. 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 the 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 (3 credits) & the communications skills requirement.**

Biology 465/665 Molecular Biology Lab (3 credits) S. Raina
001 Lec T 11:00-11:55 011 LSC
002 Lab T 12:30-4:30 206 LSC
003 Lab W 12:45-4:45 206 LSC

Description: This laboratory course 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. While learning basic techniques in recombinant DNA technology, students will learn to apply scientific method to address questions in molecular biology. ***This course fulfills the communications skills requirement.**

Prerequisites: BIO 326 & 327 Class size: 48

Biochemistry 475	General Biochemistry I	(3 credits)	Braiman/Welch
-------------------------	------------------------	-------------	---------------

MWF 9:30-10:25 001 LSC (Exams on Mondays 7-9 pm: 9/26, 10/14, 11/17)

Description: The molecular logic of life. Chemistry of water and the amino acids. Weak inter-atomic interactions. Amino acids and peptides. Primary, secondary, tertiary and quaternary structures of proteins. Protein function: enzyme mechanisms, kinetics and regulation. Flow of genetic information. DNA structure, replication, repair, recombination. RNA synthesis and processing. Protein synthesis and the genetic code. Recombinant DNA technology. Metabolic pathways of glycolysis and respiration, and application of thermodynamic principles to them.

Textbook: TBD

Prerequisites: CHE 325

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

Class size: 200 Frequency of Offering: Each fall semester

Biology 475	Biochemistry Lab	(4 credits)	Chan
--------------------	------------------	-------------	------

MW 1:00-5:00 207 LSC

Description: Experiments on proteins, enzymes, fatty acids, nucleic acids which illustrate modern biochemical techniques applied to the chemistry of living cells. Among the techniques employed are: electrophoresis; amino acid sequence determination; gel filtration; thin layer chromatography; enzyme isolation; enzyme kinetics; spectrophotometric assays; preparative ultra-centrifugation; preparation and analysis of tissue fractions; sucrose gradient centrifugation; base composition of nucleic acids. Careful recording of data is emphasized. Data are analyzed and discussed in class.

Textbook: *Fundamental Laboratory Approaches for Biochemistry*, Ninfa & Ballonite, 2nd Edition, 2010, Fitzgerald Press.

Examinations: Lab quizzes and notebook

Class size: 24 Frequency of Offering: Each fall semester

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

Proposal form & permission of instructor required.

Biology 495	Distinction Thesis in Biology	(1-3 credits)	Faculty
--------------------	-------------------------------	---------------	---------

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. Proposal & permission required.

Biology 499	Biology Thesis	(1-3 credits)	Faculty
--------------------	----------------	---------------	---------

Description: Writing of an honors thesis by senior Biology majors. Proposal & permission required.

Biology 600-001/400-001	Seminar in Epigenetics of Human Health & Disease	(3 credits)	MacDonald
--------------------------------	--------------------------------------------------	-------------	-----------

MW 3:45-5:05 214 LSC

Description: The epigenome encodes information above and beyond the sequence of DNA, acting at the interface between genes and the environment. This course will explore how epigenetic modifications influence our health and modify our risk of disease, including neurodevelopmental and neurodegenerative disorders, heart disease, and obesity. Seminar format including lectures, discussions, student presentations, and various writing assignments.

Prereqs: BIO 326 & 327; BIO 443 or 462 recommended. Jrs. & Srs. Only.

Class size: 15

Biology 600/400-003	Seminar in Cell Biology & the Cytoskeleton	(3 credits)	Langford
TTh	2:00-3:20	126 LSC	

Description: Seminar course will cover the cytoskeleton in health and disease. Topics will include human skin cell responses to fungal infections such as candidiasis and brain diseases that affect learning and memory. The primary focus will be on the actin cytoskeleton and the molecular motors of the myosin family. Advances in imaging techniques that allow real-time observation of cell migration and dynamics of the actin cytoskeleton will be presented. Topics will include cell migration, synaptic plasticity and axonal transport. Seminar format including lectures, discussions of current papers, student presentations, and various writing assignments.

Class size: 5

Biology 600-004,005/400-004,005	Global Change Ecology Lab	(3 credits)	Frank/Fridley
-004 Lec M	12:45-1:40	306 LSC	
-005 Lab W	12:45-4:45	306 LSC	

Description: In this course students will learn to measure plant, soil, and ecosystem properties associated with global warming, the spread of invasive species, deforestation, and environmental pollution. Lab activities focus on monitoring trees and shrubs in the campus Climate Change Garden, including measurements of photosynthesis and leaf behavior, root growth, and associated animal and microbial relations. Students will also develop models of forest growth by collecting data in natural forest stands in nearby Green Lakes State Park. Students will develop an understanding of the scientific method by conducting group projects that involve data analysis and class presentations.

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

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

Biology 625	Methods in Neuroscience	(0-3 credits)	Shreckengost
TBA	TBA	TBA	

Description: A practical interdisciplinary survey course whereby neuroscience faculty introduce students to a wide array of methodologies, including molecular, cellular, developmental, systems, behavioral, and cognitive neuroscientific approaches to investigate basic, pre-clinical, translational, and clinical questions to unravel the relationship between brain and behavior.

Class size: 5

Bio/Ben/Cen/Che/Phy 635	Physical Cell Biology	(3 credits)	Forstner
MW	2:15-3:35	414 Bowne	

Description: This Soft Interfaces Integrative Graduate Education and Research Traineeship (IGERT) course will emphasize current quantitative advances in cell biology and cover topics such as the structure and dynamics of cell membranes, the dynamics of the cytoskeleton and molecular motors, DNA replication and repair, genome packing, gene regulation, and signaling pathways. The course will give biology and bioengineering students a more quantitative background for describing biological processes and give physics and chemistry students a strong introduction to biomolecules and cellular processes. The course will be offered every year in the Fall semester. It will typically be taken by IGERT students in their first semester of graduate studies but is open to all graduate students.

<u>Biology 642/442</u>	Model Organism Genetics	(3 credits)	Belote
	TTh	12:30-1:50	214 LSC

Description: The shared evolutionary history of all life makes it possible to use genetically tractable organisms to study fundamental aspects of cell and developmental biology, as well as to explore the molecular basis of many human diseases. This course will focus on six of the most common model genetic systems (yeast, worms, fruit flies, zebrafish, mouse and mustard weed), examining the unique genetic features of each, and how they are being used to investigate such topics as animal and plant development, cell growth and cancer, neurological disease, behavior, and aging. The format of this seminar course includes lectures, student presentations, discussions, quizzes and writing assignments.

Prerequisites: BIO 326 and BIO 327

<u>Biology 659/459</u>	Plants & People	(3 credits)	Coleman
	TTh	12:30-1:50	011 LSC

Description: Plants are critical for sustaining life on Earth. They sequester carbon dioxide and convert solar energy to forms that can be used, acting as key agents against climate change. In addition they are a key source of food, clothing and fuel. This course will focus on how plants function individually, and as they interact with their environment. The course goals are to gain an understanding of basic plant biology at the molecular level, to understand the role of plants in the environment and in society, and to use this information to make informed opinions and decisions about current environmental issues including air pollution, land conservation, climate change and genetic modification. As plants are a model system for molecular genetics, cell biology and biochemistry research, this class is an excellent elective for students interested in these areas.

Prerequisites: Bio 121 & 123; or AP equivalent

<u>Biology 662/462</u>	Molecular Genetics	(3 credits)	Dorus
	MWF	10:35-11:30	011 LSC

Description: This course will provide a broad introduction to the study of gene and genome function, including transcription, translation, DNA replication, recombination and prokaryotic and eukaryotic mechanisms of inheritance. Gene and genome architecture, mechanisms of gene regulation, epigenetics and the molecular basis of human disease will be discussed. An emphasis will be placed on the application of high-throughput genomic, transcriptomic and epigenomic approaches to systems level analyses of genome biology.

Textbook: *Genetics: a molecular approach*

Prerequisites: BIO 326 and BIO 327

Class size: 42

<u>Biology 663/463</u>	Molecular Biotechnology	(4 credits)	S. Raina
	001 Lec	MWF 11:40-12:35	011 LSC
	002 Lab	Th 12:30-3:45	306 LSC

Description: Biotechnology I is the first course of a two-course Biotechnology series. The second course, Biotechnology II, will be offered in the spring. 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?

Class size: 24

Biology 665/465 Molecular Biology Lab (3 credits) S. Raina

001 Lec T 11:00-11:55 011 LSC
002 Lab T 12:30-4:30 206 LSC
003 Lab W 12:45-4:45 206 LSC

Description: This laboratory course 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. While learning basic techniques in recombinant DNA technology, students will learn to apply scientific method to address questions in molecular biology.

Class size: 48

Biology 688 Biological Literature (1-3 credits) Faculty

Description: Independent reading program carried out under the direction of a faculty member. Explicit permission must be obtained from a faculty member. Lectures and library problems designed to acquaint the student with current literature, techniques of searching scientific literature and preparation of reports using reference materials.

Prerequisites: Permission of instructor and submission of proposal

Biology 690 Independent Study (1-6 credits) Faculty

Description: This is a program of guided research, usually involving laboratory work.

Prerequisites: Since this course involves work done usually in faculty laboratories, arrangement must be made by the student with the faculty member who will supervise the research. The Proposal for Independent Study Courses must be made out, signed by the professor and taken to 110 LSC for department signature before registering. NOTE: This course should not be used for dissertation work.

Biology 705 Graduate Research Seminars (0-1 credit) J. Hewett

T 3:30-5:00 106 LSC

Description: Students present their thesis or dissertation research and critically evaluate the research presentations of other students.

Frequency of offering: every semester

Biology 997 **Masters Thesis** (1-6 credits)
Biology 999 **Dissertation** (1-15 credits)
GRD 998 **Degree in Progress** (0 credit hours)

3/9/16