BIOG 1101–1102 Biological Sciences, Lectures

1101, fall; 1102, spring. 2 credits each semester. Corequisite: BIOG 1103 (fall) or 1104 (spring). Prerequisite: for 1102, D or better in 1101 or permission of instructor. May not be taken for credit after BIOG 1105–1106 or 1109–1110. S-U or letter grades by permission of instructor. First lec of fall semester, F Aug. 29. No admittance after second week of classes. Evening prelims: fall, Sept. 25 and Nov. 4; spring, Feb. 19 and March 31. Fall, staff; spring, staff.

Designed for students who intend to specialize in biological sciences. The fall semester covers the chemical and cellular basis of life, energy transformations, physiology, neurobiology, and behavior. The spring semester covers genetics, development, evolution, and ecology. Each topic is considered in terms of modern evolutionary theory, and discussions of plant and animal systems are integrated.

BIOG 1103–1104 Biological Sciences, Laboratory

1103, fall; 1104, spring. 2 credits each semester. Corequisite: BIOG 1101 (fall) or 1102 (spring). Prerequisite: for 1104, D or better in 1103 or permission of instructor. Students registered for lab courses who are more than 10 minutes late for first meeting of lab forfeit registration in that course; no admittance after second week of classes. First lab of fall: week of Sept. 1; first lab of spring: week of Jan. 19. S-U or letter grades by permission of instructor. K.-C. Chen.

Designed to provide lab experience with major biological phenomena to support an understanding of the important concepts, principles, and theories of modern biology. A second objective is to help students gain expertise in the methods used by biologists to construct new knowledge. Students are exposed to basic concepts, research methods, including laboratory and data transformation techniques, and instrumentation in the major areas of biology. First-semester topics include biochemistry, physiology, plant biology, and scientific method and poster development. In the second semester, laboratory experience is provided in genetics, biotechnology, invertebrate diversity, plant and animal development, and ecology. During the first semester, students dissect a doubly pithed frog (pithing is done by the staff). Students dissect several invertebrates during the second semester. For those students who object to animal dissection, alternative materials are available for study. However, testing involves identification of important structures in real organisms.

BIOG 1105–1106 Introductory Biology

1105, fall; 1106, spring. 4 credits each semester; 2 credits by permission of instructor. Limited to 200 students. Taking 1105–1106 in sequence preferred but not required. May not be taken for credit after BIOG 1101–1104 or 1109–1110. No admittance after first week of classes. First lec of fall semester R Aug. 28, 9:05; additional study and lab. D. Campbell.

Designed primarily for biology majors, preprofessionals, and other students who desire a challenging, broad introduction to fundamental concepts of biology. Cell biology, physiology, anatomy, and biochemistry are strongly emphasized in BIOG 1105. BIOG 1106 covers genetics, development, ecology, evolution, behavior, and the diversity of organisms. Students who plan to concentrate in anatomy and physiology should consider taking this course because of the strong emphasis on organismal biology. Because some testing involves the use of predissected specimens, students who object to dissections should take BIOG 1101–1104. The course uses an autotutorial format and offers considerable flexibility in scheduling. Completion of the course requires mastery of a group of core units. Testing on these units is primarily by oral examination. Students who elect to take the course must be able to meet deadlines. Four formal laboratory sessions are offered each semester; additional laboratory work is included in the core units. Evaluation is based on written reports on experimental work, practical exams, and a comprehensive final exam. Web site: instruct1.cit.cornell.edu/courses/biog105.

BIOG 1107–1108 General Biology

Summer, 8-week session; 1107, weeks 1–4; 1108, weeks 5–8. 4 credits each. 1107–1108 fulfills introductory biology requirement for majors and forms suitable introductory biology course sequence for students intending to go to medical school. Prerequisite: one year of college or permission of instructor; for BIOG 1108, a grade of D or better in the prerequisite courses (BIOG 1101, 1103, 1105, or 1107). Fee for weeks 1–4: $25; for weeks 5–8, $25. Staff.

Designed for students who plan further study in biology. 1107 covers biological metabolism, first at the molecular level and then progressively to the organ system level. The laboratory work involves an introduction to some major techniques, vertebrate dissection, and a survey of plant organization. 1108 seeks to integrate the topics of genetics, developmental biology, population biology, and ecology in a general consideration of biological evolution. The laboratory work is a continuation of the material covered in 1107 and involves more techniques, a survey of animal organization, and the design and performance of a field study. For those students who object to animal dissection, alternative materials are available for study. However, testing involves identification of important structures in real organisms.

BIOG 1109–1110 Biological Principles

1109, fall; 1110, spring. 3 credits each semester includes lecture and lab. Limited to 500 students. Nonmajors survey course, not appropriate for major in biological science or premed requirement. Both BIOG 1109 and 1110, taken in either order, are required to fulfill distribution requirement in CALS and Human Ecology. Either course fulfills Arts and Sciences distribution requirement. Students with transfer credit must consult with course instructors for appropriate course placement. Due to overlap in content, BIOG 1109 may not be taken after BIOG 1102 or 1106, or equivalent, and BIOG 1110 may not be taken after BIOG 1101, 1105, or equivalent. Note: This course may not satisfy prerequisite for upper-level courses in biology. Letter grades only. Prelims: fall (2 in class); spring (2 in class). H. Greene, R. Wayne, E. Balko, and staff.

Both semesters of Biological Principles are intended to appeal to anyone who seeks an overview of general biology topics and current biological issues. BIOG 1109 is offered during fall

semester and introduces students to the diversity of biological organisms, Mendelian genetics, behavior, and ecology and culminates by tying together the information covered during the semester with current issues involving global climate change and biomimetic research. BIOG 1110 integrates instruction about cells, organ systems, metabolic processes, reproduction, sexually transmitted infections, contraception and bioengineering with the students' understanding of human biology. The culminating activities for spring semester includes hands-on activities involving some of the techniques used by health care professionals and forensic scientists, plus student-led debates about bioengineering. Laboratory sessions meeting alternate weeks (total of 6 labs per semester) are used for problem-solving experiments, demonstrations, discussions, and dissections (preserved vertebrate, invertebrate, and plant materials). For those students who object to dissection, alternative materials are available for study without grade penalty. Testing on dissection labs involves identification of important structures in real organisms. Registration for the lab section is required at the time of course registration. All students must enroll in lecture and lab using electronic course enrollment.

BIOBM 3300 Principles of Biochemistry, Individualized Instruction

Fall or spring. 4 credits. Prerequisites: one year introductory biology and one year general chemistry and CHEM 1570 or 3570–3580 (CHEM 3580 may be taken concurrently) or equivalent, or permission of instructor. Recommended: concurrent registration in BIOBM 3340. May not be taken for credit after BIOBM 3310, 3320, or 3330. S-U or letter grades. Evening prelims: fall, Oct. 2 and Nov. 4; spring, Feb. 19 and March 31. J. E. Blankenship, P. C. Hinkle, and staff.

Fourteen units that cover protein structure and function, enzymes, basic metabolic pathways, DNA, RNA, protein synthesis, and an introduction to gene cloning. No formal lectures, autotutorial format.

BIOBM 3310 Principles of Biochemistry: Proteins and Metabolism

Fall. 3 credits. Prerequisites: one year introductory biology, one year general chemistry, and CHEM 1570 or 3570–3580 (CHEM 1570 or 3570 should not be taken concurrently) or equivalent, or permission of instructor. May not be taken for credit after BIOBM 3300 or 3330. S-U grades by permission of instructor. Lec; evening prelim Oct. 23. G. W. Feigenson.

The chemical reactions important to biology, and the enzymes that catalyze these reactions, are discussed in an integrated lecture format. Topics include protein folding, enzyme catalysis, bioenergetics, and key reactions of synthesis and catabolism.

BIOBM 3320 Principles of Biochemistry: Molecular Biology

Spring. 2 credits. Prerequisites: one year introductory biology and previous or concurrent registration in organic chemistry, or permission of instructor. May not be taken for credit after BIOBM 3300 or 3330. S-U or letter grades by permission of instructor. Lec. B. K. Tye.

Comprehensive course in molecular biology that covers the structure and properties of DNA, DNA replication and repair, synthesis and processing of RNA and proteins, the regulation of gene expression, and the principles and applications of recombinant DNA technologies, genomics, and proteomics.

BIOBM 3330 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology

Summer, six-week session. 4 credits. Prerequisites: one year introductory biology, one year general chemistry, and CHEM 1570, or 3570–3580, or equivalents, or permission of instructor. May not be taken for credit after BIOBM 3300, 3310, or 3320. S. Ely.

Topics include the structure and function of proteins, enzyme catalysis, metabolism, and the replication and expression of genes.

BIONB 2220 Neurobiology and Behavior II: Introduction to Neurobiology

Spring. 3 or 4 credits; 4 credits with disc and written projects; 4-credit option required of students studying neurobiology and behavior. Limited to 15 students per disc; priority given to students studying neurobiology and behavior. Not open to freshmen. Prerequisites: one year introductory biology for majors and one year of chemistry. May be taken independently of BIONB 2210. S-U or letter grades. Planned M W F 12:20; disc TBA. J. R. Fetcho and staff.

General introduction to the field of cellular and integrative neurobiology. Topics include neural systems, neuroanatomy, developmental neurobiology, electrical properties of nerve cells, synaptic mechanisms, neurochemistry, motor systems, sensory systems, learning, and memory. Some discussion sections include dissections of preserved brains.

BIONB 3300 Introduction to Computational Neuroscience (also PSYCH/COGST/BME 3300)

Fall. 3 or 4 credits; 4 credits includes lab TBA providing additional computer simulation exercises. Limited to 25 students. Prerequisites: BIONB 2220 or permission of instructor. S-U or letter grades. Offered alternate years. Planned M W 2:55–4:10, lab TBA. C. Linster.

Covers the basic ideas and techniques involved in computational neuroscience. Surveys diverse topics, including neural dynamics of small networks of cells, neural coding, learning in neural networks and in brain structures, memory models of the hippocampus, sensory coding, and others.

BEE 4530 Computer-Aided Engineering: Applications to Biomedical Processes (also MAE 4530)

Spring. 3 credits. Prerequisite: heat and mass transfer course (BEE 3500 or equivalent).

MSE 5620 Biomineralization: The Formation and Properties of Inorganic Biomaterials

Spring 3 credits. Prerequisites: MSE 3010 or CHEM 1570 or CHEM 3570–3580 or equivalent or permission of instructor. L. Estroff.

This course will examine the wide variety of mineralized materials made by biological organisms including mollusk shells, mammalian bone and teeth, silica bodies in plants, and magnetotactic bacteria. The focus will be on the molecular and biological mechanisms that lead to the formation of these materials as well as their unique materials properties (mechanical, optical, magnetic).