

BIOLOGICAL SCIENCES (BSC) 412

210 Julian Hall, (309) 438-3669

Website: Bio.IllinoisState.edu

Director: Craig Gatto.

General School Information

Program Admission Requirements for New and Continuing Students:

Admission to this academic program is limited and is based on space availability and the competitiveness of the applicant pool. Factors that may be considered include, but are not limited to: courses completed, cumulative GPA, hours completed, personal interview or written statement, and samples of work completed. For additional information on minimum requirements for admission and the application and selection process, visit IllinoisState.edu/Majors or contact the undergraduate advisor for the intended major.

ASSOCIATED MINORS

The School of Biological Sciences offers coursework that contributes to the interdisciplinary Minor in Cognitive Science. For further information on this minor and advisor, consult the Interdisciplinary Studies Programs section in this *Undergraduate Catalog*. The School also offers coursework that contributes to the Minor in Environmental Studies. For further information on this minor and advisor, consult the Geography, Geology, and the Environment section of this *Undergraduate Catalog*.

HONORS IN BIOLOGICAL SCIENCES

In order to graduate with honors in Biological Sciences, a student must complete: (1) all regular requirements for the Biological Sciences Major; (2) CHE 230 and 231; (3) Mathematics through 2 semesters of calculus (MAT 145 and 146); (4) 12 hours of Biological Sciences on a tutorial basis (i.e., in-course honors) with a grade of A or B in each; (5) 3 hours of BSC 299; (6) 1 hour BSC 303; and (7) have at the time of graduation a cumulative GPA of at least 3.30 and at least 3.50 in Biological Sciences courses. A student must be in good standing with the University Honors Program at the time of graduation. Further details about the University Honors program

are available at Honors.IllinoisState.edu.

Biological Sciences Programs

Degrees Offered: B.S.

MAJOR IN BIOLOGICAL SCIENCES

—37-40 hours in Biological Sciences required.

—Required courses for the major (* denotes laboratory courses): BSC 196*, 197*, 204.

—Students must complete one of the following sequences: General Biology; Conservation Biology; Physiology, Neuroscience and Behavior; Plant Biology; Zoology; Teacher Education.

General Biology Sequence

Majors selecting this sequence will receive broad training in the biological sciences. This sequence is designed for students seeking careers in any area of biology. This sequence will also prepare students for graduate studies in the Biological Sciences and/or post-baccalaureate professional schools. The minimum requirements for this sequence are:

—38 total hours in Biological Sciences required.

—Required courses for the major (*denotes laboratory course): BSC 196*, 197*, and 204.

—Required courses for sequence: BSC 201*, 203, 219, 305.

—Students must choose two additional BSC courses with laboratories.

—Additional electives in Biological Sciences as needed to achieve the 38 hour minimum.

—Required courses outside of Biological Sciences: CHE 110 and 112 or CHE 140 and 141; either CHE 220, or CHE 230 and 231; either MAT 120 and 121, or MAT 145 and 146; and one of the following: PHY 105, 108 or 110.

—BSC 202, 307 and Biological Sciences courses below 195 may not be used in the major.

—A minimum of 12 hours in Biological Sciences courses must be completed at Illinois State University.

NOTE: One of the following may substitute for either MAT 121 or MAT 146: ECO 138, GEO 138, or PSY 138.

Conservation Biology Sequence

Biological Sciences majors selecting this sequence will receive broad training in conservation biology. This sequence is designed for students seeking careers in the conservation of natural ecosystems and their organisms (all levels of biodiversity). The coursework will also prepare students for graduate studies in conservation biology, and for internships and entry-level positions in conservation-oriented non-governmental organizations, state and federal government organizations, and environmental consulting firms. The minimum requirements for this sequence are:

- 38 hours in Biological Sciences required.
- Required courses for the major (*denotes laboratory course): BSC 196*, 197*, 204.
- Required courses for the sequence: BSC 201*, 219, 280, and 305.
- Elective courses structured across three Groups as follows:
 - One from the Conceptual Group: BSC 260*, 286, 295*, 311, 325, or 375 and 376*.
 - One from the Botany Taxon Group: BSC 211*, 212*, 223*, 330*, 333*.
 - One from the Zoology Taxon Group: BSC 292*, 294*, 296, 301*, 396*.
- Additional elective courses in Biological Sciences as needed to achieve the 38 hour minimum.
- Required courses outside of Biological Sciences: CHE 110 and 112 or CHE 140 and 141; either CHE 220, or CHE 230 and 231; either MAT 120 and 121, or MAT 145 and 146; and one of the following: PHY 105, 108 or 110.
- BSC 202, 307 and Biological Sciences courses below 195 may not be used in the major.
- A minimum of 12 hours in Biological Sciences courses must be completed at Illinois State University.

NOTE: One of the following may substitute for either MAT 121 or MAT 146: ECO 138, GEO 138, or PSY 138.

Physiology, Neuroscience and Behavior Sequence

Majors selecting this sequence will receive broad training in physiology, neuroscience and behavior. This sequence is designed for students seeking careers that involve basic scientific and applied aspects of behavior,

physiology and neuroscience. This sequence will also prepare students for graduate studies in neuroscience, physiology and animal behavior and related fields, and with additional coursework, students can meet the requirements to apply to veterinary and health professional schools. The minimum requirements for this sequence are:

- 37 hours in Biological Sciences required.
- Required courses for the major (*denotes laboratory course): BSC 196*, 197*, 204.
- Required courses for sequence: BSC 283*, 286, 327, and 343.
- 15 hours minimum in sequence-related elective courses required, at least one of which must have an associated laboratory and no more than two of these electives satisfying this requirement may be from the Psychology courses identified here: BSC 201*, 203, 219, 260*, 290, 292*, 294, 295, 296, 301*, 305, 311, 325, 345, 350, 353, 354, 367*, 396*; PSY 253, 263, 350.
- Required courses outside of Biological Sciences: CHE 110 and 112 or CHE 140 and 141; either CHE 220, or CHE 230 and 231; either MAT 120 and 121, or MAT 145 and 146; and one of the following: PHY 105, 108 or 110.
- BSC 202, 307 and Biological Sciences courses below 195 may not be used in the major.
- A minimum of 12 hours in Biological Sciences courses must be completed at Illinois State University.

NOTE: One of the following may substitute for either MAT 121 or MAT 146: ECO 138, GEO 138, or PSY 138.

Plant Biology Sequence

Majors selecting this sequence receive broad training in plant biology. This sequence is designed for students seeking jobs with industries, the government and nonprofit organizations working with plants. This sequence will also prepare students for graduate studies in plant biology. The minimum requirements for this sequence are:

- 37 hours in Biological Sciences required.
- Required courses for the major (*denotes laboratory course): BSC 196*, 197*, 204.
- Required courses for the sequence: 212*, 219, 365
- Elective courses as follows:
 - One course from the Conceptual Group: BSC 201*, 203, 260*, or 305.

Two courses from the Plant Group: BSC 211*, 223*, 330*, 333*, 335 and 336*, 346.

- Additional electives in Biological Sciences as needed to achieve the 37 hour minimum.
- Students must complete five Biological Sciences courses with laboratories (*).
- Research and internships enhance future prospects for employment and acceptance to graduate programs; hence students are strongly encouraged to pursue individual work via one of the following: 2 hours of BSC 287 Independent Study, 2 hours of BSC 398 Professional Practice (398 Biology, or 398A02 Internship in Public Outreach), or at least 3 hours of BSC 290 Research in Biological Sciences. Students are also encouraged to do a formal senior thesis (for more information see BiologicalSciences.IllinoisState.edu/undergrad/thesis).
- Required courses outside of Biological Sciences: CHE 110 and 112 or CHE 140 and 141; either CHE 220, or CHE 230 and 231; either MAT 120 and 121, or MAT 145 and 146; and one of the following: PHY 105, 108 or 110.
- BSC 202, 307 and Biological Sciences courses below 195 may not be used in the major.
- A minimum of 12 hours in Biological Sciences courses must be completed at Illinois State University.

NOTE: One of the following may substitute for either MAT 121 or MAT 146: ECO 138, GEO 138, or PSY 138.

Zoology Sequence

Majors selecting this sequence will receive broad training in Zoology. This sequence is designed for students seeking careers that involve working with animals. This sequence will also prepare students for graduate studies in Zoology and related fields (e.g., Entomology, Physiology, Wildlife Biology), and with additional coursework, students can meet the requirements to apply to veterinary and health professional schools. The minimum requirements for this sequence are:

- 37 hours in Biological Sciences required.
- Required courses for the major (*denotes laboratory course): BSC 196*, 197*, and 204.
- Required courses for the sequence: BSC

201*, 305, 325.

- 7 hours minimum in organismal zoology electives, at least one with a laboratory: BSC 286, 292*, 296, 301*, 396*.
- 7 hours minimum in functional zoology electives, at least one with a laboratory: BSC 283*, 295*, 311, 327, 343, 345, 367*.
- Additional electives in Biological Sciences as needed to achieve the 37 hour minimum.
- Required courses outside of Biological Sciences: CHE 110 and 112 or CHE 140 and 141; either CHE 220, or CHE 230 and 231; either MAT 120 and 121, or MAT 145 and 146; and one of the following: PHY 105, 108 or 110.
- BSC 202, 307 and Biological Sciences courses below 195 may not be used in the major.
- A minimum of 12 hours in Biological Sciences courses must be completed at Illinois State University.

NOTE: One of the following may substitute for either MAT 121 or MAT 146: ECO 138, GEO 138, or PSY 138.

MINOR IN BIOLOGICAL SCIENCES

Biological Sciences Sequence:

- 24 hours in Biological Sciences required.
- Required courses: BSC 196 and 197.
- At least 12 of the elective hours must be 200- or 300-level courses. NOTE: BSC 101 and 307 may not be used as electives in the minor.

MAJOR IN MOLECULAR AND CELLULAR BIOLOGY

- 72 total hours required.
- 37 hours in Biological Sciences.
- Required Biological Sciences courses (22 hours) BSC 196*, 197*, 203, 204, 219, 260*, 350 (*denotes laboratory courses).
- A minimum of 6 hours in 300-level Biological Sciences courses is required, selected from the following: BSC 329, 343, 345, 346, 351, 353*, 354*, 355, 361*, 365, 367*, 370.
- Students must pass five BSC courses with laboratories (*).
- 8-10 hours required in Physics: Either PHY 108 and 109 (10 hours), or PHY 110 and 111 (8 hours).
- 7-8 hours required in Mathematics: MAT 145 and 146. **NOTE:** One of the following

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- may substitute for MAT 146: ECO 138, GEO 138, or PSY 138.
- 20 hours required in Chemistry: CHE 140, 141, 230, 231, 232, 233, 342. Advisor may substitute CHE 242 for 342.
- BSC 202, 307, and Biological Sciences courses below 195 may not be used in the major.
- A minimum of 12 hours in Biological Sciences must be completed at Illinois State University.

HONORS IN MOLECULAR AND CELLULAR BIOLOGY

In order to graduate with honors in Molecular and Cellular Biology, a student must complete (1) all regular requirements for the Molecular and Cellular Biology Major; (2) Mathematics through 2 semesters of calculus; (3) 12 hours of Honors credit in Biological Sciences with a grade of A or B in each; (4) 3 hours of BSC 299; (5) 1 hour of BSC 303 Senior Thesis; and (6) have at the time of graduation a cumulative GPA of at least 3.30 and at least 3.50 in Biological Sciences courses.

MAJOR IN BIOLOGICAL SCIENCES TEACHER EDUCATION

The Biological Science Teacher Education major is designed to prepare students to teach secondary science.

Program Admission Requirements for New and Continuing Students:

Admission to this academic program is limited and is based on space availability and the competitiveness of the applicant pool. Factors that may be considered include, but are not limited to: courses completed, cumulative GPA, hours completed, personal interview or written statement, and samples of work completed. For additional information on minimum requirements for admission and the application process, visit IllinoisState.edu/Majors or contact the undergraduate advisor for the intended major.

Standards for Progress in the Major:

Before being admitted to the University Professional Studies program (see the University-Wide Teacher Education Program requirements in this Undergraduate Catalog), the Biological Sciences Teacher Education major must meet school requirements for admission.

Students should consult the Teacher Education advisor for information and updated requirements.

To progress through the program in a timely manner, the teacher candidate must continuously maintain a minimum cumulative 2.50 GPA and a minimum major 2.50 GPA to remain academically eligible. In order to receive teaching licensure in the state of Illinois, majors must earn a grade of C or better in all courses required for state licensure.

Biological Sciences Teacher Education Program of Study

- 89 total hours required.
- 40 hours in Biological Sciences required. A teacher education student must complete the option described as part of the entitlement program leading to Illinois Educator License with secondary 6-12 endorsement.
- Required major courses (27 hours): BSC 161, 196, 197, 201, 203, 204, 219, 231, 302, and 307.
- 13 hours of BSC electives are required, including two courses with laboratories.
- BSC 202 and Biological Sciences courses at the 100 level may not be used as electives in the major with the exceptions of BSC 161, 182, 196 and 197.
- Required science and math courses outside of Biological Sciences (23-24 hours): CHE 140 and 141; GEO 100; MAT 120 or 145; PHY 105 or 108; ECO 138, or GEO 138, or PSY 138.
- Professional Education requirements (26 hours): EAF 228 or 231, or 235; *PSY 215; TCH 212, 216, 219; and STT 399A03 (12 hours). *NOTE: PSY 110 is a prerequisite for PSY 215.
- A minimum of 12 hours in Biological Sciences courses must be completed at Illinois State University.

NOTE: CHE 140, ECO 138, GEO 100, 138, MAT 120, 145, PHY 105, 108, and PSY 138 are courses that may also count toward General Education requirements. Only 3 hours of a 4 hour course may count towards General Education.

CLINICAL EXPERIENCES IN TEACHER EDUCATION

A variety of clinical (pre-student teaching) experiences, as well as student teaching, are included in the teacher candidates professional preparation. Observations, small and large group instruction, tutoring, field experiences, and student teaching are included in the Clinical Experiences Program. The experiences offered prior to student teaching are integral parts of specific college courses. Clinical experiences are provided in off-campus professional development schools, local schools and campus laboratory schools, agencies and other approved non-school settings. The Cecilia J. Lauby Teacher Education Center monitors and documents all clinical experiences. Teacher candidates will show verification of having completed clinical experiences commensurate with attaining local, state, and national standards. Teacher candidates must provide their own transportation to clinical experiences sites.

Candidates are required to provide documentation of meeting all State of Illinois, district, and university requirements in regard to criminal background checks BEFORE beginning any clinical experiences. Criminal background checks must remain current as of the last day of the clinical experience. Candidates should consult with clinical course faculty and the Cecilia J. Lauby Teacher Education Center well in advance of clinical experiences to determine specific requirements needed each semester.

The approximate number of clinical hours associated with each course offering can be found with the appropriate course description in this Undergraduate Catalog. The following legend relates to the type and kind of activity related to a specific course.

Clinical Experiences Legend

- Observation (including field trips)
- Tutoring one-on-one contact
- Non-instructional assisting
- Small group instruction
- Whole class instruction
- Work with clinic client(s)
- Graduate practicum
- Professional meeting

Biological Sciences Courses

101 FUNDAMENTAL CONCEPTS IN BIOLOGY

NS

3 sem. hrs.

Learning and applying biological concepts in the areas of health, medicine, environment, and ethics. Not for credit major/minor. May not be taken under the P/NP option. Lecture, recitation, and lab. Materials charge optional.

101A01 FUNDAMENTAL CONCEPTS IN BIOLOGY: FOR FUTURE ELEMENTARY TEACHERS

NS

3 sem. hrs.

This course is for future elementary teachers. Learning and applying biological concepts in the areas of health, medicine, environment, and ethics. Not for credit major/minor. May not be taken under the P/NP option. Lecture, recitation, and lab. Materials charge optional.

145 HUMAN BIOLOGY

SMT

3 sem. hrs.

Study of human biology in the context of science, technology, and culture, emphasizing technological advances in medicine, disease prevention, and public health. Not for credit major. Prerequisite: One of the following: MAT 113, 118, 119, 120, 121, 130, 144, or 145.

160 MICROBIOLOGY AND SOCIETY

SMT

4 sem. hrs.

Introduction to microorganisms, their diversity, and their impact on society as agents of disease, in the environment, and in useful applications. Lecture and lab. Not for credit major. Not for credit if had BSC 260. Materials charge optional. Prerequisite: One of the following: MAT 113, 118, 119, 120, 121, 130, 144, or 145.

161 INTRODUCTION TO TEACHING SCIENCE SEMINAR

2 sem. hrs.

Introduction to the nature of scientific inquiry and research-based skills in science teaching and learning. Prerequisites: Completion of either BSC 196 or 197 or equivalent; two semesters of college completed; Teacher Education major only.

- 170 GENETICS AND SOCIETY SMT**
3 sem. hrs.
 Overview of human heredity in the context of biology, society, and culture; impact on treatment of diseases, reproductive technology, agriculture, aging/longevity, and forensics. Not for credit major. Prerequisite: One of the following: MAT 113, 118, 119, 120, 121, 130, 144, or 145.
- 181 HUMAN PHYSIOLOGY AND ANATOMY I**
4 sem. hrs.
 Fundamentals of anatomy and physiology for students in Special Education, Health Education, Nursing, and Psychology. Lecture and lab. Materials charge optional. Not for credit major.
- 182 HUMAN PHYSIOLOGY AND ANATOMY II**
4 sem. hrs.
 Fundamentals of anatomy and physiology for students in nursing and other health related professions. Lecture and lab. Materials charge optional. Not for credit major. Prerequisite: BSC 181.
- 196 BIOLOGICAL DIVERSITY NSA**
4 sem. hrs.
 Introduction to structure and function of the major groups of microorganisms, plants, and animals, emphasizing evolutionary relationships among the major groups. Lecture and lab. Materials charge optional. May not be taken under the P/NP option.
- 197 MOLECULAR AND CELLULAR BASIS OF LIFE NSA**
4 sem. hrs.
 Introduction to molecules, processes, and cellular organization of living organisms. Lecture and lab. Materials charge optional. May not be taken under the P/NP option.
- 201 ECOLOGY**
4 sem. hrs.
 Interactions between organisms and their environment at the individual, population, community, and ecosystem levels of organization. Lecture, lab, and field trips. Materials charge optional. Prerequisites: BSC 196 and 197.
- 202 HUMAN ECOLOGY SMT**
3 sem. hrs.
 Ecological principles underlying biosphere functions, human influence on the biosphere, application of ecological principles to solving and avoiding environmental problems. Lecture. Not for credit major. Prerequisites: COM 110 and ENG 101 and MAT 113, 120, 130, or 145.
- 203 CELL BIOLOGY**
3 sem. hrs.
 Structure and function of cells with emphasis on protein structure-function, cell morphology, and cellular signaling. Prerequisites: BSC 196, 197; CHE 110 and 112 or 141.
- 204 BIOLOGICAL INVESTIGATIONS**
1 sem. hr.
 Introduction to how research is conducted, including designing experiments, biological literature, data analysis, communication of results, and impacts on society. Prerequisites: BSC 196 and 197.
- 204A01 BIOLOGICAL INVESTIGATIONS: MOLECULAR AND CELLULAR BIOLOGY**
1 sem. hr.
 Introduction to how research is conducted and communicated, with emphasis and examples focusing on the field of Molecular/Cellular Biology. Prerequisites: BSC 196 and 197.
- 205 HUMAN DEVELOPMENTAL BIOLOGY**
4 sem. hrs.
 Regulation of tissue and organ patterning during early human development. Prerequisites: BSC 196 and 197.
- 211 ECONOMIC BOTANY**
4 sem. hrs.
 Diversity, origins, and history of plant uses, concentrating on economically important plants of the world. Lecture and lab. Materials charge optional. Prerequisites: BSC 196 or AGR 150, and BSC 197.
- 212 PRINCIPLES OF BOTANY**
4 sem. hrs.
 An integrative approach to understanding plants, including their physiology, structure, development, genetics, evolution and ecology. Lecture, lab and field trips. Materials charge optional. Prerequisites: BSC 196 and 197.
- 219 GENETICS**
3 sem. hrs.
 Mechanisms of heredity and genetic variation, including gene structure and function, transmission genetics, mutation, and genetic analysis. Prerequisites: BSC 196 and 197.

220 LABORATORY IN MOLECULAR GENETICS AND CELL BIOLOGY**3 sem. hrs.**

Learn and use modern genetic and molecular techniques to investigate current questions in genetics and cell biology. Lecture and lab. Materials charge optional. Prerequisites: BSC 196 or 197; a minimum of 24 hours completed.

223 ECOLOGY AND CONSERVATION OF PLANTS**4 sem. hrs.**

Ecology, conservation, and taxonomy of vascular plants. Lecture and lab. Formerly *ECOLOGY AND IDENTIFICATION OF PLANTS*. Materials charge optional. Prerequisites: BSC 196 and 197.

231 LABORATORY METHODS IN TEACHING SCIENCE**2 sem. hrs.**

Introduction to laboratory-based teaching skills in science, intended to prepare students for inquiry-based high school teaching activities. Materials charge optional. Prerequisites: Admission to Professional Studies and BSC 161 or CHE 161; Teacher Education major only.

260 MICROBIOLOGY**4 sem. hrs.**

Uniqueness, diversity, ecology, molecular biology, and practical applications of microorganisms. Lecture and lab. Materials charge optional. Prerequisites: CHE 220 or CHE 230 and 231 or concurrent registration and BSC 196 and 197.

280 CONSERVATION OF ANIMAL AND PLANT BIODIVERSITY**3 sem. hrs.**

Principles of conservation biology applied to animal, plant and ecosystem biodiversity; nature preserve design; restoring ecosystems; case studies. Prerequisites: BSC 196 and 197.

283 ANIMAL PHYSIOLOGY**4 sem. hrs.**

The physical and chemical basis of system physiology with reference to invertebrates and vertebrates. Lecture and lab. Materials charge optional. Prerequisites: BSC 196 and 197; CHE 110 and 112, or CHE 141; majors only; a minimum of 45 hours completed, or consent of the instructor.

286 ANIMAL BEHAVIOR**3 sem. hrs.**

Mechanisms and adaptive significance of behavior. Emphasis is placed on understanding animal behavior in an evolutionary context. Lecture. Prerequisites: BSC 196 and 197.

290 RESEARCH IN BIOLOGICAL SCIENCES**1-3 sem. hrs.**

Field and/or laboratory research in the biological sciences involving participation in the scientific process with faculty and graduate students. Students are expected to work (on average) a minimum of 3 hours per week for each hour of credit. Multiple enrollments are allowed; maximum of 4 hours from BSC 287, 298A01, 290, 299, or 398 may be counted toward major requirements. Prerequisite: Consent of the instructor.

292 INVERTEBRATE ZOOLOGY**4 sem. hrs.**

Diversity, phylogeny, comparative anatomy and physiology of invertebrate animals. Lecture and lab. Materials charge optional. Prerequisites: BSC 196 and 197.

295 COMPARATIVE VERTEBRATE ANATOMY**4 sem. hrs.**

Evolution and comparative anatomy of vertebrates. Lecture and lab. Materials charge optional. Prerequisites: BSC 196 and 197.

296 MAMMALIAN BIOLOGY**3 sem. hrs.**

Introduction to origins, evolution, structure-function complexes, adaptive radiation, ecology, reproductive strategies, behavior and conservation biology of mammals. Lecture. Prerequisites: BSC 196 and 197.

301 ENTOMOLOGY**4 sem. hrs.**

Biology and taxonomy of insects. Lecture, lab, and field trips. Materials charge optional. Prerequisites: BSC 196, 197, and 201, or graduate standing.

302 STUDENT TEACHING SEMINAR**1 sem. hr.**

Student teachers reflect on their teaching through on-line and Web-based assignments as well as development of their professional portfolios. Prerequisite: Concurrent registration in STT 399A03.

303 SENIOR THESIS**1 sem. hr.**

Preparation of a thesis based upon original research in the biological sciences. Prerequisites: BSC 204; a minimum 3 credit hours of BSC 290 or 299; a minimum 3.00 GPA, senior standing, and consent of the Assistant Director of Undergraduate Studies and faculty thesis advisor.

304 SENIOR SEMINAR IN BIOLOGY**1 sem. hr.**

Oral and written reports on current topics in biology. Prerequisites: 2 of the following: BSC 201, 203, 212, 219, 260, 283.

305 BIOLOGICAL EVOLUTION**3 sem. hrs.**

Origin of life, molecular evolution, mechanisms of evolutionary change, natural selection, speciation, and contemporary issues in evolutionary biology. Formerly BSC 297. Prerequisites: BSC 196 and 197; a minimum of 45 hours completed.

306 REGIONAL AND AREA STUDIES**1-9 sem. hrs.**

Intensive on-site studies of organisms and their environments. Field work required. Multiple enrollments are allowed with different content. Prerequisite: Consent of the instructor, or graduate standing.

307 METHODS IN THE TEACHING OF BIOLOGY**3 sem. hrs.**

Strategies, curricula, and materials applicable to teaching secondary school science. Includes Clinical Experiences: 40 hours. Prerequisites: TCH 216 or equivalent; Admission to Professional Studies.

310 SENIOR SEMINAR IN**MOLECULAR AND CELLULAR BIOLOGY****1 sem. hr.**

Finding, analyzing, and communicating scientific literature through written or oral presentations, with focus on current topics in molecular and cellular biology. Formerly *BIOCHEMISTRY/MOLECULAR BIOLOGY SEMINAR*. Prerequisites: BSC 197, 203 and 219.

311 RAIN FOREST ECOLOGY**3 sem. hrs.**

Introduction to the natural history and ecology of rain forests; intensive tropical field work and investigative learning. Foreign travel and field work required. Formerly BSC 306A08. Prerequisites: BSC 201 and consent of the instructor, or graduate standing.

319 GENETICS OF BEHAVIOR**4 sem. hrs.**

This course will explore how genes contribute to various behaviors using the scientific literature and a hands-on laboratory experience. Lecture and lab. Materials charge optional. Prerequisite: BSC 219.

325 ECOLOGICAL PHYSIOLOGY OF ANIMALS**3 sem. hrs.**

Exploration of the physiological adaptations animals have evolved in response to habitat variation. Prerequisites: BSC 196 and 197; a minimum of 45 hours completed, or graduate standing.

327 HORMONES, BRAIN AND BEHAVIOR**3 sem. hrs.**

Exploration of relationships among hormones, brain, and behaviors associated with reproduction, aggression, stress, parenting, affiliation, homeostasis and development in animals. Prerequisite: BSC 283 or 286 or consent of the instructor, or graduate standing.

329 HUMAN GENETICS**3 sem. hrs.**

Detection, expression, transmission, and molecular manipulation of human traits; emphasis on medical genetics. Prerequisites: BSC 203 and 219, or graduate standing.

330 BIOLOGY OF ALGAE**4 sem. hrs.**

Origin, evolution, diversity, systematics, cell biology, biogeochemistry, physiology, and ecology of terrestrial, freshwater, and marine algae. Lecture and lab. Formerly *PHYCOLOGY*. Prerequisite: One of the following: BSC 201, 203, 212, 219, 260, or consent of the instructor, or graduate standing.

333 PLANT DIVERSITY**4 sem. hrs.**

History and diversity of plants and other green organisms covering major events, groups of organisms, and their phylogenetic relationships. Lecture and lab. Prerequisite: One of the following: BSC 211, 212, 223; or graduate standing.

335 PLANT TAXONOMY**3 sem. hrs.**

Classification taxonomy, and phylogeny of seed plants; distinguishing characteristics of major groups; use of botanical nomenclature and reference materials. Prerequisites: One of the following: BSC 211, 212, 223; concurrent registration in BSC 336, or graduate standing.

336 LABORATORY IN PLANT IDENTIFICATION**1 sem. hr.**

Plant identification; identification tools and methods; descriptive morphology and terminology; field identification of flowering plants and major plant families; specimen collection, documentation, and curation. Prerequisite: Concurrent registration in BSC 335, or graduate standing.

343 INTRODUCTION TO NEUROBIOLOGY**3 sem. hrs.**

Cellular and molecular aspects of neuronal function; neurotransmitter families; central nervous system development, anatomy and function; and neuropathology. Prerequisites: BSC 196 and 197 or consent of the instructor, or graduate standing.

345 INTRODUCTION TO ENDOCRINOLOGY**3 sem. hrs.**

Cellular and molecular coordination of tissues which secrete chemical compounds to regulate growth, reproduction, metabolism, and ion homeostasis. Prerequisites: BSC 196 and 197, or graduate standing.

346 DEVELOPMENTAL BIOLOGY**3 sem. hrs.**

Molecular mechanisms of cell differentiation and tissue patterning during embryonic and post-embryonic development in different organisms. Formerly *DEVELOPMENTAL BIOLOGY OF ANIMALS*. Prerequisites: BSC 203 or consent of the instructor, or graduate standing. BSC 219 is recommended.

350 MOLECULAR BIOLOGY**3 sem. hrs.**

DNA structure and replication, the Genetic Code, transcription, translation, genetic regulation, RNA splicing, and transposons. Prerequisites: BSC 203, 219; CHE 220, or 230 and 231, or graduate standing. CHE 242 or 342 is recommended.

351 CELL SIGNALING AND REGULATION**3 sem. hrs.**

Molecular mechanisms by which cells communicate and make decisions. Includes signal transduction pathways; regulation of cell form, growth, division, differentiation. Prerequisites: BSC 197 and 203, or graduate standing.

353 BIOTECHNOLOGY LABORATORY I: DNA TECHNIQUES**3 sem. hrs.**

Application and theory of molecular techniques using prokaryotic systems, including DNA and protein analysis, DNA cloning and bacterial genetics. Lecture and lab. Material charge optional. Prerequisites: BSC 219; CHE 220 or CHE 230-232, or graduate standing.

354 BIOTECHNOLOGY LABORATORY II: CELL BIOLOGY TECHNIQUES**3 sem. hrs.**

Applications and theory of cell biology to study eukaryotic systems using biochemistry, cell culture, and immunology techniques. Lecture and lab. Materials charge optional. Prerequisites: BSC 203 required, or graduate standing. CHE 220 or CHE 230-232 is recommended.

355 GENOMICS AND BIOINFORMATICS**3 sem. hrs.**

Concepts and practice of genome sequencing and analysis, postgenomic applications and bioinformatics. Prerequisites: BSC 203 and 219, or graduate standing.

361 MICROBIAL PATHOGENS**4 sem. hrs.**

Pathogenesis, identification, cultivation, and classification of bacteria, viruses, fungi, and animal parasites associated with diseases of man. Lecture and lab. Materials charge optional. Prerequisites: BSC 203 and 260, or graduate standing.

365 BIOENERGY PLANT/MICROBE BIOLOGY AND THE ENVIRONMENT**3 sem. hrs.**

The molecular, cellular, and organismal biology of microbes and plants as a source of alternate energy and associated global change. Prerequisite: One of the following: BSC 201, 203, 212, 219, 260, or consent of the instructor, or graduate standing.

367 IMMUNOLOGY**4 sem. hrs.**

Molecular, cellular, transplantation and tumor immunology; antimicrobial immunity; immunochemistry. Lecture and lab. Materials charge optional. Prerequisite: BSC 203, or graduate standing.

370 TOPICS IN MOLECULAR AND CELLULAR BIOLOGY**3 sem. hrs.**

In-depth investigation of a current area of research within molecular and cellular biology. Multiple enrollments are allowed for credit if content is different. Prerequisites: BSC 197, 203, 219.

370A01 GENETICS OF BEHAVIOR**3 sem. hrs.**

The course examines the primary scientific literature to understand how different genes and environmental factors influence the behaviors of a variety of organisms. Prerequisites: BSC 197, 203, 219, or graduate standing.

370A02 MOLECULAR AND CELLULAR BASIS OF HUMAN PATHOPHYSIOLOGY**3 sem. hrs.**

This course provides the student with knowledge of the basic molecular and cellular mechanisms underlying human pathophysiological processes. Prerequisites: BSC 196 and 197, or graduate standing. BSC 203, 219, or 283 are recommended.

370A03 PROGRAMMING FOR BIOLOGISTS**3 sem. hrs.**

This course covers introductory programming for the analysis of DNA, RNA, and protein sequences. Prerequisites: BSC 197, 203, 219.

375 STREAM ECOLOGY LECTURE**3 sem. hrs.**

Introduction to the structure and function of stream ecosystems examining hydrology, geomorphology, chemistry, and ecology of stream ecosystems. Prerequisites: BSC 196, 197; a minimum of 45 hours completed, or consent of the instructor, or graduate standing.

376 STREAM ECOLOGY LABORATORY**1 sem. hr.**

The integration of the geology, chemistry, zoology, and ecology of flowing waters and their conservation and restoration. Materials charge optional. Prerequisite: Concurrent registration in BSC 375, or graduate standing.

396 AVIAN BIOLOGY**4 sem. hrs.**

Origin, evolution, diversity, systematics, biogeography, morphology, physiology, ecology, behavior, and conservation biology of birds. Lecture, lab, and field trips. Materials charge optional. Prerequisites: BSC 196 and 197, or graduate standing.

398 PROFESSIONAL PRACTICE: BIOLOGY**1-6 sem. hrs.**

Practical experience through employment in agencies such as biological research facilities, zoological or botanical gardens, game reserves, or environmental service. One credit per 50-60 hours of work experience. CR/NC only. Multiple enrollments are allowed; maximum 16 hours Professional Practice; no more than 4 hours from BSC 287, 290, 298A01, 299, or 398 may be counted toward major requirements. Prerequisites: A minimum of 45 hours completed in BSC with a 2.50 GPA in all natural sciences; consent of the Professional Practice advisor.

398A02 PROFESSIONAL PRACTICE: INTERNSHIP IN PUBLIC OUTREACH**1-6 sem. hrs.**

Practical first-hand experience in educating the general public about science at a botanical garden or arboretum, aquarium, park, nature center, museum, zoo, or similar facility. One credit hour per 50-60 hours of outreach experience. CR/NC only. Multiple enrollments are allowed; maximum of 6 hours Internship in Public Outreach; no more than 4 hours from BSC 290, 298A01, 299, 305, or 398 may be counted toward major requirements. Prerequisites: A minimum of 45 hours completed in BSC major with a 2.50 GPA in all natural sciences and enrolled in Conservation Biology, Plant Biology, or Zoology sequence. Consent of the department Professional Practice internship supervisor.