### Ecology, Evolution, & Behavior Course Descriptions 12-14

#### Introductory Courses

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<tr>
<th>Course Number and Title</th>
<th>Course Description and Prerequisites</th>
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| **BIO 311C: Introductory Biology I** | Introduction to biological energy transformation, cell structure and physiology, and gene expression.  
Prerequisites: Credit or registration for CH 301 or 301H. |
| **BIO 311D: Introductory Biology II** | Introduction to mechanisms of inheritance, evolution, physiology, and species interactions. Basic principles of Mendelism, molecular genetics, structure and function of genes and chromosomes, populations and evolution.  
Prerequisites: BIO 311C with a grade of at least C-. |
| **BIO 325: Genetics** | Basic principles of Mendelism, molecular genetics, structure and function of genes and chromosomes, populations and evolution.  
Prerequisites: BIO 311C and 311D with a grade of at least C- in each |
| **CH 301: Principles of Chemistry I** | Three lecture hours a week for one semester. Some sections also require one enrichment/discussion hour a week; these are identified in the Course.  
Prerequisite: Credit with a grade of at least C- or registration for one of the following: Mathematics 305G, 408C, 408D, 408K, 408L, 408M, 408N, 408S, Statistics and Scientific Computation 302; and an appropriate score on the ALEKS chemistry placement examination. |
| **CH 302: Principles of Chemistry II** | Development and application of concepts, theories, and laws underlying chemistry.  
Prerequisites: Credit with a grade of at least C- in Chem 301 or 301H; and credit with a grade of at least C- or registration for one of the following: M408C, 408D, 408K, 408L, 408M, 408N, 408S, SSC 302 |
| **CH 204: Introduction to Chemical Practices** | Introduction to the techniques of modern experimental chemistry. Designed to provide basic laboratory and analytical skills. May include organic, analytical, and physical chemistry, as well as materials science.  
Prerequisites: Credit or registration for CH 302. |

#### Calculus Course – Choose One

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| **M408C: Differential and Integral Calculus** | Introduction to the theory and applications of differential and integral calculus of functions of one variable; topics include limits, continuity, differentiation, the mean value theorem and its applications, integration, the fundamental theorem of calculus, and transcendental functions.  
Prerequisites: A score of at least 80 on the ALEKS placement examination. |
| **M 408N: Differential Calculus for Science** | Introduction to the theory of differential calculus of functions of one variable, and its application to the natural sciences. Subjects may include limits and differentiation, with applications to rates of change, extremes, graphing, and exponential growth and decay.  
Prerequisites: A score of at least 70 on the ALEKS placement examination. |

#### Physics Sequence – Choose One 8 Hour Sequence

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Prerequisites: M 305G and credit or registration for PHY 102M;  
PHY 302K and 102M and credit or registration for PHY 102N. |
| **PHY 317K & 117M; and 317L & 112N** | Introductory courses designed and recommended primarily for premedical |
General Physics I and II

students and others in the biomedical sciences whose professional or pre-professional training includes an introductory course in calculus. Mechanics, heat, and sound, with biomedical applications. Electricity and magnetism, light, atomic and molecular physics, nuclear physics, and their biomedical applications.

**Prerequisites:** M 408C, or 408K and coenrollment in 408L or M408N and coenrollment in M408S and credit or registration for PHY 117M; PHY 317K and 117M and credit or registration for PHY 117N.

PHY 301 & 101L; and 316 &112L: Mechanics; Electricity and Magnetism

Designed for students who intend to major in science or mathematics.

**Prerequisites:** M 408C, or 408K and coenrollment in 408L or M408N and coenrollment in M408S and credit or registration for PHY 101L; PHY 301 and 101L, M 408D, or 408L and coenrollment in 408M and credit or registration for PHY 116L.

PHY 303K and 103M; and 303L & 103N: Engineering Physics I and II


**Prerequisites:** M 408C, or 408K and coenrollment in 408L or M408N and coenrollment in M408S and credit or registration for PHY 103M; PHY 303K and 103M, M 408D, or 408L and coenrollment in 408M and credit or registration in PHY 103N.

**OTHER**

SSC 328M: Biostatistics

Introduction to methods of statistical analysis of biological data.

**Prerequisites:** Four hours of coursework in BIO and either M 408D or 408L.

AND (choose one of the following)

CH 320M: Organic Chemistry I

The development of organic chemical structure, nomenclature, and reactivity.

**Prerequisites:** CH 302 with a grade of at least C-, and credit or registration for CH 204 or 317.

OR

CS 303E: Elements of Computers and Programming

Problem solving and fundamental algorithms for various applications in science and business and on the World Wide Web. Introductory programming in a modern object-oriented programming language.

**Prerequisites:** None

CS 313E: Elements of Software Design

Object-oriented design of software in a modern high-level language, using software library packages. Introduction to elementary data structures and complexity of algorithms.

**Prerequisites:** CS 303E or 305J with a grade of at least C-

OR

GEO 401: Physical Geology

Nature, properties, and distribution of crustal materials; surficial processes; internal processes; origin of continents, oceans, and ocean basins; mineral and fuel resources.

Prerequisites: None

GEO 303: Introduction to Geology

Mineral and rock composition of the earth; measurement of geologic time; origin and evolution of life; earth's interior; plate tectonics; depositional environments and processes; ancient climates; humans, earth resources, and the environment.

Prerequisites: None
OR

upper division M course

REQUIRED UPPER-DIVISION BIOLOGY COURSES - 18 HOURS OF COURSEWORK FROM THE FOLLOWING:

CELLULAR AND MOLECULAR BIOLOGY - CHOOSE AT LEAST 3 HOURS

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<tbody>
<tr>
<td>BIO 320</td>
<td>Cell Biology</td>
<td>Principles of eukaryotic cell structure and function; macromolecules, energetics, membranes, organelles, cytoskeleton, gene expression, signaling, division, differentiation, motility, and experimental methodologies.</td>
<td>BIO 325 or 325H with a grade of at least C-.</td>
</tr>
<tr>
<td>BIO 326R</td>
<td>General Microbiology</td>
<td>Overview of the major areas of micro-biological study, including cell structure and function, genetics, host-microbe interactions, physiology, ecology, diversity, and virology.</td>
<td>BIO 325 or 325H and CH 302 or 302H with grades of at least C-.</td>
</tr>
<tr>
<td>BIO 344</td>
<td>Molecular Biology</td>
<td>Molecular basis of cellular processes: gene structure and function; DNA replication; RNA and protein synthesis; viruses; molecular aspects of immunology and cancer, and recombinant DNA.</td>
<td>BIO 325 or 325H with a grade of at least C-.</td>
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<tr>
<td>BIO 349</td>
<td>Developmental Biology</td>
<td>Principles of animal development, with emphasis on developmental mechanisms.</td>
<td>BIO 325 or 325H with a grade of at least C-.</td>
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PHYSIOLOGY – CHOOSE AT LEAST 3 HOURS

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<tr>
<td>BIO 328</td>
<td>Introductory Plant Physiology</td>
<td>General principles of the mineral nutrition, water relations, metabolic activities, growth and development of green plants.</td>
<td>BIO 325 or 325H with a grade of at least C-, and CH 302 or 302H.</td>
</tr>
<tr>
<td>BIO 361T</td>
<td>Comparative Animal Physiology*</td>
<td>Physiology of organ systems in animal phyla, with special emphasis on physiological adaptations of organisms to their environment.</td>
<td>BIO 325 or 325H with a grade of at least C-.</td>
</tr>
<tr>
<td>BIO 365R</td>
<td>Vertebrate Physiology</td>
<td>Introduction to the nervous system and other excitable tissues. Subjects may include membrane potentials, ion channels, synaptic transmission, learning and memory, skeletal and cardiac muscle, and how systems of neurons lead to sensation and motor output. Human diseases are used to illustrate perturbation of normal function.</td>
<td>BIO 325 or 325H with a grade of at least C-.</td>
</tr>
<tr>
<td>BIO 365S</td>
<td>Vertebrate Systems Physiology</td>
<td>Overview of body fluids, the cardiovascular system, respiration, digestion, metabolism, and endocrinology.</td>
<td>BIO 311C; 325 or 325H; Chem 301 and one of the following: M408C, 408K, 408N, 408R, SSC 302 with a grade of at least C- in each.</td>
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ECOLOGY – CHOOSE AT LEAST 3 HOURS

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<tr>
<td>BIO 357</td>
<td>Evolutionary Ecology*</td>
<td>Principles of modern ecology, particularly as they relate to natural selection and evolutionary theory.</td>
<td>BIO 325 or 325H with a grade of at least C-.</td>
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BIO 373: Ecology*

An introduction to ecology, the study of relationships among organisms and between organisms and their environment; adaptations, population, communities, and ecosystems. Includes both plants and animals and both terrestrial and aquatic ecosystems.

Prerequisites: BIO 325 or 325H with a grade of at least C-.

MNS 320: Marine Ecology

Study of ecological processes at different levels of integration in marine ecosystems.

Prerequisites: BIO 311D, and CH 302 or 302H with a grades of at least C-.

**EVOLUTION (required)**

BIO 370: Evolution

Introduction to modern evolutionary biology, focusing on the evolution of molecular, developmental, morphological, and behavioral traits. Genetic and ecological bases of evolutionary changes within populations and of evolutionary divergence in animals and plants.

Prerequisites: BIO 325 or 325H with a grade of at least C-.

**BEHAVIOR AND COMPARITIVE PHYSIOLOGY – CHOOSE AT LEAST 3 HOURS**

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<tr>
<td>Bio 322: Structure, Physiology, and Reproduction of Seed Plants</td>
<td>The principles of structure and functioning of higher plants; special attention to the dynamics of growth and development and reproduction. Prerequisites: BIO 325 or 325H with a grade of at least C-, CH 302 or 302H, and coenrollment in BIO 122L.</td>
</tr>
<tr>
<td>BIO 122L: Structure, Physiology, and Reproduction of Seed Plants Laboratory</td>
<td>Observation of structure and reproduction in seed plants and employment of experimental techniques that demonstrate physiological processes, especially processes of growth and development. Prerequisites: Concurrent enrollment in BIO 322.</td>
</tr>
<tr>
<td>BIO 359K: Principles of Animal Behavior</td>
<td>An introduction to the study of animal behavior: descriptive analysis of behavior; physiological basis of behavior; development of behavior; adaptive significance and evolution of behavior; communication and social behavior. Prerequisites: BIO 325 or 325H with a grade of at least C-.</td>
</tr>
<tr>
<td>BIO 361T: Comparative Animal Physiology*</td>
<td>Physiology of organ systems in animal phyla, with special emphasis on physiological adaptations of organisms to their environment. Prerequisites: BIO 325 or 325H with a grade of at least C-.</td>
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(*may only count in one area)

**TAXON- BASED COURSES – CHOOSE AT LEAST 3 HOURS**

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<tr>
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<tr>
<td>BIO 321L: Aquatic Entomology*</td>
<td>The taxonomy of aquatic insects; the use of aquatic insects in biomonitoring. Prerequisites: BIO 325 or 325H with a grade of at least C-.</td>
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<tr>
<td>BIO 324: Survey of the Plant Kingdom</td>
<td>Review of the groups of living and fossil plants, emphasizing their organization, reproduction, and evolution. Prerequisites: BIO 325 or 325H with a grade of at least C-, and coenrollment in BIO 124L.</td>
</tr>
<tr>
<td>BIO 124L: Survey of the Plant Kingdom Laboratory</td>
<td>Demonstration of members of various plant groups, using cultures and prepared materials, to emphasize organization, reproduction, and evolution. Prerequisites: BIO 325 or 325H with a grade of at least C-, and coenrollment in BIO 324.</td>
</tr>
<tr>
<td>BIO 327: General Phycology</td>
<td>A general survey of the algae and of their biology. Prerequisites: Biology 325 or 325H; 324 and 124L with a grade of at least C- in each, and coenrollment in BIO 127L.</td>
</tr>
</tbody>
</table>
BIO 127L: Laboratory in General Phycology
Survey of various algal groups, including direct observations of their biology, exposure to research techniques, and instruction in culture procedures.  
Prerequisites: BIO 325 or 325H with a grade of at least C-, and credit with a grade of at least C- or registration for BIO 327.

BIO 340L: Biology of Birds*
Anatomy, physiology, classification, and ecology of birds.  
Prerequisites: BIO 325 or 325H with a grade of at least C-.

BIO 342L:

BIO 448L: Invertebrate Biology
A study of the diversity and evolution of multicellular invertebrate animals, with emphasis on common themes in animal body construction and function.  
Prerequisites: BIO 325 or 325H with a grade of at least C-.

BIO 352: Reproductive Biology of Flowering Plants
Pollination biology, breeding systems, reproductive strategies, and fruit and seed dispersal from evolutionary and ecological vantage points.  
Prerequisites: BIO 325 or 325H with a grade of at least C-.

BIO 353F: Field Entomology*
A field course on insects, with emphasis on field study techniques, visual identification of species, collecting techniques, and curation in the field.  
Prerequisites: BIO 325 or 325H with a grade of at least C-.

BIO 453L: Entomology*
Characteristics, importance, and biology of the major groups of insects.  
Prerequisites: BIO 325 or 325H with a grade of at least C-.

BIO 354L: Ichthyology*
Overview of the evolution, biology, and ecology of fishes, emphasizing freshwater fishes.  
Prerequisites: BIO 325 or 325H with a grade of at least C-.

BIO 455L: Vertebrate Natural History*
Phylogeny, taxonomy, life histories, habits, and distribution. Field trips to be arranged.  
Prerequisites: BIO 325 or 325H with a grade of at least C-.

BIO 369L: Herpetology*
Biology of amphibians and reptiles, including evolution, ecology, behavior, physiology, life history, and field identification.  
Prerequisites: BIO 325 or 325H; and BIO 455L, 357, 359K, or 478L with a grade of at least C- in each.

MNS 352D: Marine Botany*
Exploration of the marine algae and seagrasses of the south Texas coast, with emphasis on their taxonomy, physiology, and ecology; field trips to representative coastal habitats. Requires several field trips, including one weekend trip.  
Prerequisites: Upper-division standing; one of the following courses: BIO 322, 324, 325 or 325H, 328, MNS 352C and three additional semester hours of coursework in biology.

MNS 354: Marine Invertebrates*
Study of invertebrate taxonomy, structure, behavior, and ecology, with emphasis on field sampling and laboratory studies of invertebrate habitats of the Texas coast.  
Prerequisites: Six hours of BIO or consent of instructor.

MNS 354C: Biology of Fishes*
Anatomy, physiology, behavior, life history, taxonomy, and distribution of fishes, with emphasis on field sampling and laboratory studies of the coastal biota. Requires several field trips, including one weekend trip.
MNS 354E: Aquatic Microbiology

Ecology, physiology, distribution, and growth of heterotrophic and autotrophic bacteria and fungi in waters and sediments.

Prerequisites: BIO 311D, CH 302 or 302H, and consent of instructor.

ADDITIONAL BIOLOGY COURSES – CHOOSE AT LEAST 6 HOURS FROM ANY OF THE FOLLOWING AREAS

EVOLUTION:

BIO 458L: Systematics

Comparative study of biological variation of living and fossil organisms, including speciation, biogeography, taxonomy, and phylogeny of genes, populations, species, and higher taxa.

Prerequisites: BIO 325 or 325H with a grade of at least C-.

BIO 363: Plant Speciation

Nature of species in higher plants, speciation phenomena in plants, natural hybridization, polyploidy, agamospermy, evolutionary mechanisms.

Prerequisites: BIO 325 or 325H with a grade of at least C-.

BIO 472L: Taxonomic Plant Anatomy

An advanced course emphasizing those aspects of plant anatomy that are most reliable and useful for systematic purposes. A laboratory course with two weekend field trips to the Marine Science Institute at Port Aransas to perform ecological studies in the Texas coastal zone.

Prerequisites: BIO 374 and 174L with a grade of at least C- in each.

BIO 374: Plant Anatomy with Histological Techniques

Tissue organization and cellular details of stems, roots, and leaves of seed plants, with emphasis on development and function.

Prerequisites: BIO 325 or 325H with a grade of at least C-, and coenrollment in BIO 174L.

BIO 174L: Laboratory in Plant Anatomy with Histological Techniques

Demonstration of cellular details and tissue systems of plant organs; instruction in the preparation of plant materials for histological examination.

Prerequisites: BIO 325 or 325H with a grade of at least C-, and credit with a grade of at least C- or registration for BIO 374.

BIO 478L: Comparative Vertebrate Anatomy

Study of vertebrate morphology from developmental anatomy to the function, biomechanics, and phylogenetic relationships of living and fossil taxa.

Prerequisites: BIO 325 or 325H with a grade of at least C-.

ECOLOGY:

BIO 456L: Limnology and Oceanography*

Introduction to the study of the interactions between aquatic organisms and their environments.

Prerequisites: BIO 325 or 325H with a grade of at least C- and CH 302 or 302H.

BIO 364: Microbial Ecology

The ability of microbes to adapt to and change their environment.

Prerequisites: BIO 325 or 325H and BIO 126L and 326R with a grade of at least C- in each.

BIO 364E: Current Topics in Advanced Microbial Ecology

Development and structure of microbial communities, microbial phylogeny, endosymbiont and symbiont relationships, biogeochemistry, elemental cycling by microbes, and the microbial ecology of disease.

Prerequisites: BIO 325 or 325H, and 364 with a grade of at least C- in each.

BIO 373L: Ecology Laboratory*

Intensive field ecology. Includes group field experiment and observation,
independent projects, and field trips to other vegetation zones. Students complete weekly write-ups of observation and data analysis, reports of independent projects, and an oral presentation on an independent project. **Prerequisites:** Credit or registration for BIO 373.

**MNS 120L (Spring)**

A laboratory course with two weekend field trips to the Marine Science Institute at Port Aransas to perform ecological studies in the Texas coastal zone. **Prerequisites:** Credit or registration for MNS 320.

**MNS 352C: Estuarine Ecology**

General ecological principles of estuarine environments in Texas, including physiography, hydrography, and plant and animal community structure and productivity. Requires several field trips in addition to lecture hours, including one weekend trip. **Prerequisites:** Upper-division standing and 6 hours in BIO, CH, GEO or PHY.

**BEHAVIOR:**

**BIO 438L: Animal Communication**

Animal communication from a multidisciplinary perspective, with emphasis on quantitative analysis, sensory processing, and evolution of signals. **Prerequisites:** BIO 325 or 325H ; and BIO 359K or 370 with a grade of at least C- in each.

**BIO 359J: Behavioral Ecology**

Advanced topics in behavioral ecology, with detailed consideration of animal communication, altruism, sexual selection, plant-animal interactions. **Prerequisites:** BIO 325 or 325H and BIO 359K or 370 with a grade of at least C- in each.

**BIO 359R: Animal Sexuality**

The biology of sexuality, including genetics, morphology, physiology, and psychology of sex. **Prerequisites:** BIO 325 or 325H with a grade of at least C-.

**CONSERVATION BIOLOGY:**

**BIO 359: Global Environmental Change**

Global change as it affects terrestrial ecosystems, including feedback between ecosystems and the atmosphere. Greenhouse gases and global warming, ozone, biological invasions, and land-use change. **Prerequisites:** Global change as it affects terrestrial ecosystems, including feedback between ecosystems and the atmosphere. Greenhouse gases and global warming, ozone, biological invasions, and land-use change.

**BIO 375: Conservation Biology**

Application of principles of ecology to the preservation of wild plant and animal species and to the preservation, management, and restoration of natural and seminatural ecosystems. Emphasis on scientific, biological aspects of issues such as endangered species protection, preserve design, and forest management. **Prerequisites:** BIO 325 or 325H and BIO 357, 359J, or 373 with a grade of at least C- in each.

**MNS 354Q: Marine Environmental Science***

Application of the principles of marine science to the study of environmental issues: toxicology, biogeochemical cycles, and biological and ecological impacts of xenobiotic materials in the coastal zone. **Prerequisites:** BIO 311D, and CH 302 or 302H.

* Denotes a field component