### Plant Biology Course Descriptions 12-14

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<th>Course Number and Title</th>
<th>Course Description and Prerequisites</th>
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<td><strong>INTRODUCTORY COURSES</strong></td>
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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 Chem 301 or 301H. |
| 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, Statistics and Scientific Computation 302; and an appropriate score on the ALEKS chemistry placement examination. |
| 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 OF THE FOLLOWING SEQUENCES** |                                        |
| 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.  
**AND** |
| M408 D: Sequences, Series, and Multivariable Calculus | Introduction to the theory and applications of sequences and infinite series, including those involving functions of one variable, and to the theory and applications of differential and integral calculus of functions of several variables; topics include parametric equations, sequences, infinite series, power series, vectors, vector calculus, functions of several variables, partial derivatives, gradients, and multiple integrals.  
**Prerequisites:** M 408C, 408L, or 408S with a grade of at least C-.  
**OR** |
| 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.

**AND**

M 408S: Integral Calculus for Science

Restricted to students in the College of Natural Sciences. Introduction to the theory of integral calculus of functions of one variable, and its applications to the natural sciences. Subjects may include integration and its application to area and volume, and transcendental functions, sequences, and series and their application to numerical methods.

**Prerequisites:** M 408C, 408K, or 408N with a grade of at least C-.

**INTRODUCTORY BIO LAB – CHOOSE ONE**

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<td>BIO 206L: Intro Lab Experiments in Biology</td>
<td>The organizing principles of biology (such as molecular and cellular functions, reproduction, development, homeostatic mechanisms, and organismal physiology and behavior) are used within a comparative and evolutionary framework to train students in modern laboratory techniques, bioinformatics, experimental design, and interpretation of results. <strong>Prerequisites:</strong> Credit or registration for Biology 311C or 311D (or credit for Biology 211 or 214).</td>
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<tr>
<td>BIO 208L – W: Field Biology</td>
<td>Field projects, laboratory exercises, field trips, and computer simulation exercises to acquaint students with the principles and applications of ecology and some of the experimental and descriptive methods of ecological investigations. <strong>Prerequisites:</strong> Credit or registration for BIO 311D. Taught in the spring and fall only.</td>
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**ORGANIC CHEMISTRY**

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<td>CH 320M: Organic Chemistry I</td>
<td>The development of organic chemical structure, nomenclature, and reactivity. <strong>Prerequisites:</strong> CH 302 with a grade of at least C-, and credit or registration for CH 204 or 317.</td>
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<td>CH 320N: Organic Chemistry II</td>
<td>The development of organic chemical reactivity, with a focus on carbohydrates, proteins, and nucleic acids. <strong>Prerequisites:</strong> CH 204 or 317 and CH 310M with a grade of at least C- in each, and credit or registration for CH 210C.</td>
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<tr>
<td>CH 220C: Organic Chemistry Laboratory</td>
<td><strong>Prerequisites:</strong> CH 204 or 317 and CH 310M with a grade of at least C- in each, and credit or registration for CH 310N</td>
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**PHYSICS SEQUENCE – CHOOSE ONE 8 HOUR SEQUENCE**

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<td>PHY 302 &amp; 102M; and 302L &amp; 102N: General Physics--Technical Course</td>
<td>Noncalculus technical courses in physics: Mechanics, Heat, and Sound. Electricity and Magnetism, Light, Atomic and Nuclear Physics. <strong>Prerequisites:</strong> M 305G and credit or registration for PHY 102M; PHY 302K and 102M and credit or registration for PHY 102N.</td>
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<tr>
<td>PHY 317K &amp; 117M; and 317L &amp; 112N: General Physics I and II</td>
<td>Introductory courses designed and recommended primarily for premedical students and others in the biomedical sciences whose professional or preprofessional 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. <strong>Prerequisites:</strong> M 408C, or 408K and coenrollment in 408L or M408N and coenrollment in M408S and credit or registration for PHY 117M;</td>
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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**

A general survey of physics. Primarily laws of motion, heat, and wave phenomena. Electricity and magnetism, optics, and atomic phenomena. **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.

### REQUIRED UPPER-DIVISION BIOLOGY COURSES

**BIO 320: Cell Biology**

Principles of eukaryotic cell structure and function; macromolecules, energetics, membranes, organelles, cytoskeleton, gene expression, signaling, division, differentiation, motility, and experimental methodologies. **Prerequisites:** BIO 325 or 325H with a grade of at least C-.

**BIO 328: Introductory Plant Physiology**

General principles of the mineral nutrition, water relations, metabolic activities, growth and development of green plants. Prerequisite: BIO 325 or 325H with a grade of at least C-, and CH 302 or 302H.

**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-.

**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-.

### 15 HOURS OF COURSEWORK FROM THE FOLLOWING:

**BIO 320L: Cell Biology Laboratory**

Explores the complex structures and functions of cells through direct observation and experimentation. Subjects may include regulation of gene transcription and translation, protein sorting, organelles and membrane trafficking, cytoskeletal dynamics, and cell division. Students use a combination of modern molecular biology, biochemistry, and microscopy techniques, with a strong emphasis placed on hypothesis-driven approaches, proper experimental design, and clear scientific writing and presentation. **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 320.

**Bio 322: Structure, Physiology, and Reproduction of Seed Plants**

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.

**BIO 122L: Structure, Physiology, and Reproduction of Seed Plants**

Observation of structure and reproduction in seed plants and employment of
Reproduction of Seed Plants Laboratory  experimental techniques that demonstrate physiological processes, especially processes of growth and development.

Prerequisites: Concurrent enrollment in BIO 322.

BIO 324: Survey of the Plant Kingdom  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.

BIO 124L: Survey of the Plant Kingdom Laboratory  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.

BIO 327: General Phycology  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.

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 331L – Laboratory Studies in Molecular Biology  The methods and principles of molecular biology in a research laboratory context. Students conduct a research project directed by a faculty member.

Prerequisites: BIO 205L, 206L, 208L, or 126L; BIO 325 or 325H with a grade of at least C-.

BIO 343M

BIO 350M: Plant Molecular Biology  Fundamentals of plant molecular biology, including structure and expression of the chloroplast and mitochondrial genomes.

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

BIO 351: Economic Botany  An in-depth analysis of the origin of domesticated plant species, the role in nature of plant products, and the ways natural products have been altered through artificial selection.

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 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 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-.

BIO 372L: Taxonomic Plant Anatomy  An advanced course emphasizing those aspects of plant anatomy that are most reliable and useful for systematic
purposes.

**Prerequisites:** BIO 325 or 325H and BIO 374 and 174L with a grade of at least C- in each.

**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-.

**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.

**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 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, 359L, or 373 with a grade of at least C- in each.

* Neither BIO 370 or 373 may count in more than one area

**11 ADDITIONAL HOURS OF UPPER DIVISION COURSEWORK IN THE COLLEGE OF NATURAL SCIENCE OR THE JACKSON SCHOOL OF GEOECEINCES IS REQUIRED FOR THIS DEGREE.**