PLANT BIOLOGY

Department of Plant Biology
College of Natural Science

105 Plant Biology
Fall, Spring. 3(3-0) SA: BOT 105
Plant structure, function, development, genetics, diversity and ecology.

106 Plant Biology Laboratory
Fall, Spring. 1(0-3) P: PLB 105 or concurrently SA: BOT 106
Cell structure, anatomy, physiology, growth and development, and diversity of plants.

162 Organismal and Population Biology
Fall, Spring, Summer. 3(3-0) Interdepartmental with Biological Science and Zoology.
Administered by Biological Science. P: BS 161 or BS 181H or LB 145 SA: BS 110, BS 148H Not open to students with credit in BS 182H or LB 144.

172 Organismal and Population Biology Laboratory
Fall, Spring, Summer. 2(1-3) Interdepartmental with Biological Science and Zoology.
Administered by Biological Science. P: (BS 162 or concurrently) or (BS 182H or concurrently) SA: BS 110, BS 158H Not open to students with credit in BS 182H or LB 144.
Nature and process of organismal biology including experimental design, statistical methods, hypothesis testing in genetics, ecology, and evolution.

182H Honors Organismal and Population Biology
Fall. 3(3-0) Interdepartmental with Biological Science and Lyman Briggs and Zoology.
Administered by Biological Science. P: (BS 162 or concurrently) or (BS 182H or concurrently) SA: BS 110, BS 158H Not open to students with credit in BS 162 or LB 144.
Diversity and basic properties of organisms, with emphasis on genetic principles, ecological interactions, and the evolutionary process. Historical approach to knowledge discovery.

192H Honors Organismal and Population Biology Laboratory
Fall. 2(1-3) Interdepartmental with Biological Science and Lyman Briggs and Zoology.
Administered by Biological Science. P: BS 182H or concurrently SA: BS 158H, BS 110 Not open to students with credit in BS 172 or LB 144.
Nature and process of organismal biology, including experimental design and statistical methods, hypothesis testing, genetics, ecology, and evolution.

203 Biology of Plants
Fall. 3(3-0) P: BS 161 and BS 162
Evolution and diversification of plants. Structural innovations and physiological attributes of vascular land plants.

218 Plants of Michigan
Fall. 3(2-2) P: BS 162 or PLB 105 or LB 144 or BS 182H SA: BOT 218

301 Introductory Plant Physiology
Fall. 3(3-0) P: (CEM 141 or CEM 151 or LB 171 or CEM 181H) and ((PLB 105 or BS 161 or LB 145 or BS 181H and completion of Tier I writing requirement) SA: BOT 301
General principles of plant physiology relating plant structure to function. Cell physiology, water relations, effects of light and temperature, respiration, photosynthesis, mineral nutrition, and hormone action.

316 Experiments in Plant Biology
Spring. 4(2-5) P: (CEM 141 or concurrently) and (CEM 161 or concurrently) and (CEM 251 or concurrently) or (((CEM 152 or concurrently) and (CEM 161 or concurrently) and (CEM 261 or concurrently) or PLB 203) and completion of Tier I writing requirement
Exploration of fundamental topics in plant biology using modern techniques for studies at the molecular and ecological levels.

319 Introduction to Earth System Science
Fall. 3(3-0) Interdepartmental with Entomology and Geological Sciences and Sociology and Zoology.
Administered by Entomology. RB: Completion of one course in biological or physical science.
Systems approach to Earth as an integration of geochemical, geophysical, biological and social components. Global dynamics at a variety of spatio-temporal scales. Sustainability of the Earth system.

335 Plants Through Time
Spring of even years. 3(3-0) Interdepartmental with Geological Sciences.
Administered by Plant Biology. P: BS 162 or PLB 105 or GLG 201 or LB 144 or BS 182H P: Open to juniors or seniors. SA: BOT 335
Evolutionary history of plants, development of ecosystems, and use of plant fossils in the reconstruction of ancient environments and climate.

341 Fundamental Genetics
Fall, Spring, Summer. 4(4-0) Interdepartmental with Zoology.
Administered by Zoology. P: BS 161 or LB 145 or BS 181H Principles of heredity in animals, plants and microorganisms. Classical and molecular methods in the study of gene structure, transmission, expression and evolution.

355 Ecology
Fall, Spring, Summer. 3(3-0) Interdepartmental with Zoology.
Administered by Zoology. P: BS 162 or LB 144 or BS 162H SA: ZOL 250
Plant and animal ecology. Interrelationships of plants and animals with the environment. Principles of population, community, and ecosystem ecology. Application of ecological principles to global sustainability.

355L Ecology Laboratory (W)
Fall, Spring, Summer. 1(0-3) Interdepartmental with Zoology.
Administered by Zoology. P: (ZOL 355 or concurrently) or completion of Tier I writing requirement
Population, community, and ecosystem ecology, utilizing plant and animal examples to demonstrate general field principles.

400 Introduction to Bioinformatics
Spring. 2(2-3) Interdepartmental with Biochemistry and Molecular Biology and Microbiology and Molecular Genetics.
Administered by Plant Biology. P: (STT 200 or STT 201 or STT 251 or STT 421 or STT 203 or MMG 201 or BMB 200) RB: An introductory biology course covering basic genetics, macromolecules, evolution, energetic metabolism, genetic materials, and signal transduction is recommended for non-biology majors. A statistic course covering random variable, distributions, and basic probability theory is recommended for biology majors.
Bioinformatic theory and practice. How to manage and analyze sequences, structures, gene expression, and other types of biological data.

402 Biology of Fungi
Fall of odd years. 3(2-3) Interdepartmental with Plant Pathology. Administered by Plant Biology. P: BS 162 or BS 161 or PLB 105 or LB 145 or BS 182H or BS 181H SA: BOT 402
Characteristics, habitats, and diversity of major groups of fungi. Ecologic and economic importance of fungi.

407 Diseases and Insects of Forest and Shade Trees
Spring. 4(3-3) Interdepartmental with Entomology and Plant Pathology.
Administered by Plant Pathology. P: (PLB 105 or BS 162 or LB 144) and Completion of Tier I Writing Requirement SA: BOT 407
Diseases, insects, and environmental problems affecting trees in forests, parks, suburbs, and nurseries. Methods of control.

415 Plant Physiology
Spring. 3(3-0) P: (CEM 143 or CEM 251 or CEM 351) and (BS 161 or LB 145 or BS 181H) SA: PLB 414

418 Plant Systematics
Spring, Summer. 3(2-3) P: PLB 105 or BS 162 or LB 144 or BS 182H SA: BOT 418
Classification and evolution of higher plants, with emphasis on identification, characteristics of plant families, and systematic theory and practice.

424 Algal Biology
Fall of even years. Summer of odd years. 2(4-2) Interdepartmental with Zoology.
Administered by Plant Biology. P: (BS 162 or LB 144 or BS 182H or BS 181H or BS 182H SA: BOT 424
Algal taxonomy, systematics, physiology, ecology, and environmental assessment. Lab focus on identification of freshwater algal genera collected from regional habitats.

434 Plant Structure and Function
Spring of odd years. 4(2-4) P: (BS 161 and BS 162) or (LB 144 and LB 145) or (BS 181H and BS 182H) SA: BOT 434
Plant anatomy from structural and functional perspectives. Physiological, developmental, and ecological significance of cell types, tissue types, and meristems of vegetative and reproductive plant parts.
440 Field Ecology and Evolution
Spring, 4 credits. Interdepartmental with Zoology. Administered by Zoology. R: ZOL 355
Solving conceptual and practical research problems in ecology and evolution under field conditions.

441 Plant Ecology
Fall, 3(3-0): P: (BS 162 or LB 144 or PLB 105 or ZOL 355 or BS 182H) and completion of Tier I writing requirement SA: BOT 441

445 Evolution (W)
Fall, 3(3-0) Interdepartmental with Crop and Soil Sciences and Zoology. Administered by Zoology. R: ZOL 345

485 Tropical Biology
Spring, 3(3-0) Interdepartmental with Entomology and Zoology. Administered by Zoology. R: ZOL 355 R: Open only to juniors or seniors.
Tropical biota emphasizing evolutionary and ecological principles compared across tropical ecosystems.

490 Directed Studies
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: Completion of Tier I writing requirement. R: One year of college biology. R: Approval of department. SA: BOT 490
Directed study of published literature in an area of plant biology.

490H Honors Directed Studies
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: Completion of Tier I writing requirement. R: One year of college biology. R: Approval of department. SA: BOT 490H
Directed study of published literature in an area of plant biology.

495 Botanical Garden Internship
Fall, Spring, Summer. 2 to 8 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department. R: BOT 495
Activities, functions and organization of botanical gardens. Principles of live plant curation.

498 Undergraduate Research
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. P: (BS 161 and BS 162 and BS 171 and BS 172) or (LB 144 and LB 145) or (BS 181H and BS 182H and BS 191H and BS 192H) and completion of Tier I writing requirement R: Approval of department. SA: BOT 498
Laboratory and/or field research in an area of plant biology.

499 Senior Seminar
Spring, 2(2-0) A student may earn a maximum of 4 credits in all enrollments for this course. P: (PLB 498) and completion of Tier I writing requirement SA: BOT 499
A capstone experience that focuses on current developments and issues in plant biology. Scientific writing and oral presentation.

800 Seminar in Plant Biology
Fall, 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to graduate students. SA: BOT 800
Current research and approaches in plant biology.

802 Selected Topics in Plant Biology
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate students in College of Natural Science or College of Agriculture and Natural Resources. SA: BOT 802
Recent developments in plant biology.

803 Integrative Topics in Plant Biology
Spring of even years. 1 to 2 credits. A student may earn a maximum of 4 credits in all enrollments for this course. Integrative topics in plant biology. Molecular, physiological, ecological, and evolutionary perspectives. Proposal writing and presentation.

805 Special Problems in Physiology and Biochemistry
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate students in College of Natural Science or College of Agriculture and Natural Resources. SA: BOT 805
Faculty directed individualized study of a selected problem.

806 Special Problems in Genetics and Molecular Biology
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate students in College of Natural Science or College of Agriculture and Natural Resources. SA: BOT 806
Faculty directed individualized study of a selected problem.

807 Special Problems in Mycology
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate students in College of Natural Science or College of Agriculture and Natural Resources. SA: BOT 807
Faculty directed individualized study of a selected problem.

809 Special Problems in Ecology, Systematics, and Evolution
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate students in College of Natural Science or College of Agriculture and Natural Resources. SA: BOT 809
Faculty directed individualized study of a selected problem.

810 Theories and Practices in Bioinformatics
Spring, 3(2-2) Interdepartmental with Biochemistry and Molecular Biology and Microbiology and Molecular Genetics. Administered by Plant Biology. R: Basic genetics, macromolecules, evolution, energy metabolism, genetic materials, and signal transduction is recommended for non-biology majors. A statistic course covering random variables, distributions, and basic probability theory is recommended for biology majors. Theories and algorithms behind bioinformatics tools. Basic tool development by writing scripts in the Python programming language for data analysis.

812 Principles and Applications of Plant Genomics
Fall, 3(2-2) Undergraduate genetics course and one undergraduate course of Biochemistry, cell biology or molecular biology R: Open to graduate students.
Foundations, principles, and applications of genome sequencing, genome analysis, expression profiling, and systems biology with respect to plant biology.

820 Plant Reproductive Biology and Polyploidy
Spring of odd years. 1(3-0) Interdepartmental with Crop and Soil Sciences and Forestry and Horticulture and Plant Pathology. Administered by Horticulture. R: Introductory Genetics and Plant Biology Genetic processes underlying variations in plant reproductive biology and polyploidy. Utilization of these characteristics in plant breeding.

821 Crop Evolution
Spring of odd years. 1 credit. Interdepartmental with Crop and Soil Sciences and Forestry and Horticulture and Plant Pathology. Administered by Horticulture. R: Introduction to Genetics and Plant Biology Cultural and biological aspects of the evolution of domestic plants.

822 Historical Geography of Crop Plants
Spring of odd years. 1 credit. Interdepartmental with Crop and Soil Sciences and Forestry and Horticulture and Plant Pathology. Administered by Horticulture. R: Introduction to Genetics and Plant Biology Development and spread of the major crop species.

826 Tropical Biology: An Ecological Approach
Spring, Summer. 8 credits. Interdepartmental with Zoology. Administered by Plant Biology. R: Approval of department; application required. SA: BOT 826
Principles of tropical ecology at the population, community, and ecosystem levels. Given at various sites in Costa Rica by the Organization for Tropical Studies.

828 Conservation and Genetics
Fall of even years. 3(2-2) Interdepartmental with Fisheries and Wildlife and Zoology. Administered by Fisheries and Wildlife. R: ZOL 341 or CSS 350 or ANS 314 Population and evolutionary genetic principles applied to ecology, conservation, and management of fish and wildlife at the individual, population, and species level.
nitrogen fixation, carbon dioxide fixation, lipid metabolites.

Photosynthetic and respiratory electron transport, nitrogen metabolism and specialized metabolism, carbon partitioning, cell walls, sulfur and nitrogen metabolism and specialized metabolism including isoprenoids, phenylpropanoids and alkaloids.

Major conceptual, theoretical and empirical questions in evolutionary biology. Readings and lectures are synthesized in student discussions and papers.

Statistical modeling and interpretation of biological data using computationally intensive methods for estimation and inference. General linear models, mixed and process models, and estimation strategies applied to students using their own data using the R language.

Current techniques used to characterize and compare genes and genomes. Genetic variation, assays of variation. Data analysis and computer use to conduct a phylogenetic analysis to compare organisms and infer relationships.

Recent advances in genetics and molecular biology of higher plants.

Structure and function of natural ecosystems and their responses to global environmental change. Biogeochemical cycles, food webs, energy flow, nutrient cycling, and ecosystem management and restoration.

Practical experience designing and analyzing mathematical models in ecology from single species to communities, food webs and ecosystems.

Research in anatomy, bryology cell biology, ecology, genetics, molecular biology, morphology, mycology, paleobotany, pathology, physiology and systematics.

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