

401 A Survey of Physics (3) A survey of physics from earliest times to the present, emphasizing the unifying philosophical and mathematical principles. Classical theories of gravitation, electromagnetism, and relativity. Various forms of quantum mechanics, quantum electrodynamics, and recent theories of particles, fields, and their interactions. Consideration of the effects of physics on modern society and the practice of physics from a value-oriented perspective. Written reports on important original papers, thought-provoking problems combining different fields of classical physics, and a final oral and written report on some independent study.

Registration Restriction(s): Physics major; minimum student level – senior.
Registration Permission: Consent of instructor.

411 Introduction to Quantum Mechanics (3) Fundamental principles of quantum mechanics and methods of calculation. Solution of the Schrodinger equation for simple systems. Application to atomic, molecular, nuclear, and condensed matter physics.

(RE) Prerequisite(s): 240 and Mathematics 435.

412 Introduction to Quantum Mechanics (3) Fundamental principles of quantum mechanics and methods of calculation. Solution of the Schrodinger equation for simple systems. Application to atomic, molecular, nuclear, and condensed matter physics.

(RE) Prerequisite(s): 411.

421 Modern Optics (4) Transmission of light in uniform, isotropic media, reflection and transmission at interfaces. Mathematics of wave motion and interference effects. Rudiments of Fourier optics and holography.

Contact Hour Distribution: 3 hours lecture and 3 hours lab.

(DE) Prerequisite(s): 138 or 136 or 431 or 232.

Registration Permission: Consent of instructor.

431 Electricity and Magnetism (3) Electrostatics, magnetostatics, and coupled electric and magnetic fields, Maxwell's Equations, and electromagnetic waves and radiation.

(DE) Prerequisite(s): 138 or 136 or 232.

432 Electricity and Magnetism (3) Electrostatics, magnetostatics, coupled electric and magnetic fields, Maxwell's Equations, and electromagnetic waves and radiation.

(RE) Prerequisite(s): 431.

441 Contemporary Physics I (3) An introduction to the major fields of contemporary physics – quantum mechanics, atomic and molecular physics, electromagnetic radiation, lasers, and quantum fluids.

(RE) Prerequisite(s): 240 and 312.

(DE) Prerequisite(s): 321.

442 Contemporary Physics II (3) An introduction to the major fields of contemporary physics – solid state physics, magnetism, nuclear physics, medical imaging, particle physics, and cosmology.

(RE) Prerequisite(s): 441.

453 Team Research Project I (3) Student teams select the topic in consultation with the instructor and develop a plan for the project. Each team carries out the project with regular oral and written progress reports. Culminating in a final report.

(RE) Prerequisite(s): 361 and 461.

454 Team Research Project II (3) Student teams will carry out major experimental or computational projects that were planned and begun in 453. Regular oral and written progress reports culminate in a final report.

(RE) Prerequisite(s): 453.

461 Modern Physics Laboratory (3) Introduction to fundamental and modern techniques in experimental physics and to the theory and practice of measurement and data analysis. Selected experiments in nuclear, atomic, molecular and solid state physics, and modern optics.

Contact Hour Distribution: 6 hours lab per week.

(RE) Prerequisite(s): 361.

(DE) Prerequisite(s): 240 or 411.

462 Modern Physics Laboratory (3) Advanced experiments and experimental techniques in modern physics. Experimental team work. Thorough quantum mechanical interpretation of the results and preparation of scientific reports.

Contact Hour Distribution: 6 hours lab per week.

(RE) Prerequisite(s): 461.

490 Senior Seminar (1-3) Topics of current interest.

Repeatability: May be repeated with consent of department. Maximum 6 hours.

491 Foreign Study (3-15)

Repeatability: May be repeated. Maximum 15 hours.

492 Off-Campus Study (3-15)

Repeatability: May be repeated. Maximum 15 hours.

493 Research and Independent Study (1-3) Research and study in field of particular interest with faculty guidance.

Repeatability: May be repeated. Maximum 6 hours.

Registration Permission: Consent of department.

Plant Sciences (791)

115 Plants for Health, Aesthetics, and Recreation (3) Introduction to the wide variety of plants used in society to enhance health, beautify surroundings and facilitate recreational activities. Exploration of how cultures value their trees, flowers, vegetables, fruits, herbs and grasses, with emphasis on landscaping, people/plant interactions, sports turf, organic gardening and nutrition.

210 Horticulture: Principles and Practices (3) An introduction to the biology and technology underlying the use and production of horticultural crops and landscape plants. Structure, growth, and development of horticultural plants from a practical and scientific approach. Environmental effects, basic principles of propagation, and greenhouse and outdoor production. Nutrition, pruning and chemical control of growth. Pest control and branches of horticulture.

(RE) Prerequisite(s): Biology 111 and Biology 112.

220 Basic Landscape Plants (3) Identification, classification, adaptation, and culture and landscape design uses of basic ornamental trees, shrubs, and vines.

Contact Hour Distribution: 2 hours and 1 lab.

226 Public Horticulture (2) Study of the public horticulture profession. Attention given to the diversity of public horticulture institutions, career opportunities, and research. Discussion of current topics and issues.

230 Interior Plantscaping (3) History and introduction of the interior plantscaping industry. Identification, culture, propagation, and use of plants for the commercial interior plantscape. Management of the interior environment including light, humidity, growing media, insects, and diseases. Commercial use of containers, planters, water features, and artificial plants.

240 Turfgrass Management (3) Practical turfgrass management. Cultivar selection, identification, and establishment. Basic fertility programs, mowing, irrigation practices, and thatch removal and compaction control. Pest identification and basic controls.

Contact Hour Distribution: 2 hours lecture.

Comment(s): Students in turfgrass science and management concentration must also register for 241.

241 Turfgrass Management Lab (1) Laboratory addressing topics presented in 240.

Contact Hour Distribution: 2-hour lab.

(RE) Corequisite(s): 240.

250 World Food and Fiber Plant Production (3) Introduction to important world crops and production systems. Emphasis on plant terminology, origin, distribution and use, world agro-ecosystems, environmental and economic sustainability, current technology in crop production.

280 Fundamentals of Landscape Design (3) History of landscape design as it relates to contemporary applications. Awareness and sensitivity to the landscape. Basic graphic skills and design theory with an emphasis on residential landscape planning. Introduction to landform, landscape materials, and planting design.

Contact Hour Distribution: 1 hour and 2 labs.

290 Fall Herbaceous Ornamental Plants (3) Identification, culture, and landscape use of late summer and fall herbaceous ornamental plants including annuals, perennials, herbs, and ornamental grasses. Basic gardening practices and design elements using such herbaceous ornamental plants.

(RE) Corequisite(s): 210.

291 Spring Herbaceous Ornamental Plants (3) Identification, culture, and landscape use of spring and early summer herbaceous ornamental plants including annuals, perennials, herbs, bulbs, and wildflowers. Basic gardening practices and design elements using such herbaceous ornamental plants.

(RE) Corequisite(s): 210.

328 Conservatories: Management, Operations, and Display (1) Study of the history, value, and role of public garden conservatories. Management, operations, and display of plants in controlled environments for research, conservation, and public education and entertainment.

(RE) Prerequisite(s): 226.

329 Horticultural Interpretation: Educational Programming for Adults and Children (1) Strategic planning, programming, and budgeting for adult and youth education within a public garden.

(RE) Prerequisite(s): 226.

330 Plant Propagation (2) Physiology, methodology, and environmental requirements for propagation.

Contact Hour Distribution: 2 hours and 1 lab.

(RE) Prerequisite(s): 210 and Biology 112.

(DE) Prerequisite(s): Biology 111.

331 Interpreting Research Findings (1) Basic statistical concepts required for understanding and evaluating research findings.

Recommended Background: 2 mathematics courses.

Registration Restriction(s): Minimum student level – junior.

341 Integrated Turfgrass Management and Environmental Benefits (2) Utilization of resources available to the turfgrass manager (e.g., extension, research, professional associations). Benefits of turfgrass in the environment, including bioremediation, urban greening, and carbon sequestration.

(RE) Prerequisite(s): 240 and Biology 112.

(DE) Prerequisite(s): Biology 111.

343 Turfgrass Entomology (1) Biological study and collection of arthropods that challenge maintenance of healthy grasses, turf, and sod. Review and discussion of sampling/monitoring strategies and decision-making guidelines to help manage turfgrass pests.

(RE) Prerequisite(s): 240 and Biology 112.

(DE) Prerequisite(s): Biology 111.

348 Landscape Plant Physiology (2) Physiological principles as they relate to landscape design and construction, turfgrass management, and public horticulture – photosynthesis and transpiration, respiration, water and hormonal relations, mineral nutrition, plant development, and response to the environment.

(RE) Prerequisite(s): 210 and Biology 112.

(DE) Prerequisite(s): Biology 111.

Registration Restriction(s): 2.25 GPA.

350 Basic Landscape Construction (3) Basic materials and detailing. Introduction to the landscape construction and contracting industry. Application of landscape materials, wood, concrete and masonry construction. Site drainage and landscape grading.

Contact Hour Distribution: 2 hours and 1 lab.

(RE) Prerequisite(s): 280.

353 Plant Genetics, Breeding, and Biotechnology (3) Genetic principles and techniques used in plant modification. Principles of molecular, transmission and quantitative genetics as applied to plant breeding.

(RE) Prerequisite(s): Biology 111 and Biology 112.

360 Practicum in Landscape Construction (3) Practical experience in implementation of landscape development projects. Directed lab and field instruction in planting operations and basic landscape construction including interpreting and implementing landscape design drawings and specifications.

Contact Hour Distribution: Two 3-hour labs.

(RE) Corequisite(s): 350.

370 Grounds Maintenance (3) Identification and understanding of maintenance tasks, transplanting, soil amendments, growth control, irrigation, climate protection, and pest control. Maintenance and use of equipment; management practices.

Contact Hour Distribution: 2 hours and 1 lab.

(RE) Prerequisite(s): 210.

380 Supplemental Landscape Design Graphics (3) Refinement of graphic skills. Sketches, elevations, sections, isometric projections, and perspectives. Lettering, plan graphics, color rendering, and other visual presentation media.

Contact Hour Distribution: Two 2-hour labs.

(RE) Prerequisite(s): 280.

410 Nursery Management and Production (3) Management methods as applied to retail and wholesale nurseries and landscape contracting firms. Methods of producing liners, container and field-grown woody liners, containers and field-grown ornamental plants.

(RE) Prerequisite(s): 330 and Environmental and Soil Sciences 210.

(DE) Prerequisite(s): 220.

421 Native Plants in the Landscape (3) Native plants and plant communities as a basis for landscaping and environmental restoration. Weekly lecture coupled with either an outing or service practicum of invasive exotic plant removals or planting of natives. Study and work sites will primarily be demonstration projects of the University of Tennessee Environmental Landscape Design Lab. They include local schoolyard habitats, greenways, wetlands, streambanks, and shorelines.

(RE) Prerequisite(s): 220 or Ecology and Evolutionary Biology 330.

(DE) Prerequisite(s): 210.

427 Management and Administration of Public Horticulture Institutions (2) Management of resources in non-profit institutions, support organizations, and communities. Theoretical framework and institutional mission, strategic planning and programming, financial accounting and budgeting, development and fund raising, personnel policies, volunteer development, marketing and publicity, legal issues, relationships between staff and governing boards, the use of information technology in management and governance systems, and conservation/preservation roles in community development.

(RE) Prerequisite(s): 226 and 210.

429 Field Study of Public Horticulture Institutions (2) Extended 10-12 day field study of various public horticulture institutions such as botanical gardens, arboreta, historical grounds, zoos, conservatories, cemeteries, and nature preserves. Application and travel fee required.

(RE) Prerequisite(s): 226 and 210.

430 Greenhouse Management (3) Principles of greenhouse operation and management for commercial crop production. Greenhouse construction and operation, crop scheduling, and cost accounting. Environmental inputs and cultural practices as they affect plant physiological processes and influence plant growth and development.

Contact Hour Distribution: 2 hours lecture and one 2-hour lab.

(RE) Prerequisite(s): Agriculture and Natural Resources 290 or Computer Science 100.

434 Fruit and Vegetable Crops (3) Botanical description, geographical distribution, general cultural practices of warm and cool season vegetables, small fruits, and deciduous tree fruits. A Saturday field trip is required.

Contact Hour Distribution: 2 hours lecture and one 2-hour lab.

(RE) Prerequisite(s): 210 and Biology 112.

(DE) Prerequisite(s): Biology 111.

435 Field and Forage Crops (2) Agronomic principles of crop production and management. Crop improvement, cropping systems, tillage, fertilization, pest management, and harvest and utilization of major field and forage crops.

Contact Hour Distribution: 2 hours and 1 lab.

436 Plant and Garden Photography (2) Principles and techniques of photography as they relate to plants and gardens. Study of equipment options and field shooting under various weather conditions and in different seasons.

Registration Restriction(s): Minimum student level – senior.

437 Public Garden Operations and Management (2) An analysis of year-round operations and management of public gardens. Case studies involving time and labor management, budget development and management, implementation of volunteer programs, information dissemination methods for public outreach, and management of grounds and facilities using the University of Tennessee Institute of Agriculture Gardens as a model.

(RE) Prerequisite(s): 226 and 210.

439 Botanic Garden Practicum (1-3) Experiences in active public horticulture projects in the UT Gardens under supervision of staff members. Student should make arrangements for practicum with a faculty mentor prior to enrollment.

Repeatability: May be repeated. Maximum 3 hours.

Registration Restriction(s): Minimum student level – junior.

Registration Permission: Consent of instructor.

441 Advanced Turfgrass Management (2) Principles and scientific basis of turfgrass culture. Adaptation, ecology, physiology, climatic influences on grass culture. Clipping, water management, and design.

Contact Hour Distribution: 1-hour lecture and one 1-hour lab.

(RE) Prerequisite(s): 240 and Biology 112.

(DE) Prerequisite(s): Biology 111.

442 Turf Root-zone Construction (2) Construction and management of root-zones for home lawns, golf courses, and athletic fields.

(RE) Prerequisite(s): 240 and Biology 112.

(DE) Prerequisite(s): Biology 111.

446 Horticultural Therapy (3) Introduction to the application of horticulture as therapy for treatment, rehabilitation, and/or training of individuals with disabilities.

(RE) Prerequisite(s): 210 and 226.

Registration Restriction(s): Minimum student level – senior.

448 Horticultural Internet Technology (3) Creation and management of information resources for the Internet with a focus on development of visual and oral communications skills through a series of individual and team exercises in writing, graphics, and public speaking. **(WC)**

(DE) Prerequisite(s): Communication Studies 210 or 240.

Registration Restriction(s): Minimum student level – senior.

449 Advanced Turf Practicum (1-3) Experiences in active turf projects in the UT turfgrass sciences and management program under supervision of staff members. Student should make arrangements for practicum with a faculty mentor prior to enrollment.

Repeatability: May be repeated. Maximum 3 hours.

(RE) Prerequisite(s): 240.

Registration Restriction(s): Minimum student level – junior.

Registration Permission: Consent of instructor.

450 Specialty Landscape Construction (3) Methods of design, materials, and construction techniques for specialized components of the landscape industry. Irrigation systems, outdoor lighting, garden ponds, and water features.

451 Plant Tissue Culture (3) (See *Entomology and Plant Pathology 451*.)

454 Plant Biotechniques (3) Lectures will discuss recombinant DNA technology, molecular assisted breeding of economically important crops, gene cloning, and transformation technologies. Examples will be given of food and ornamental crops, pharmaceuticals, and renewable energy sources produced using biotechnology, as well as potential risks of this technology. Labs will include electrophoresis, tissue culture, plasmid preps, genomic DNA preps, PCR, plant transformation, and genomic techniques.

Contact Hour Distribution: 1 hour and one 3-hour lab.

(RE) Prerequisite(s): 353 or Biology 240.

457 Weed Management (2) Principles of weed interference, integrated management, and herbicide selectivity and behavior. Specific recommendations for various crop and non-crop situations.

(RE) Prerequisite(s): *Environmental and Soil Sciences 210*.

458 Turf Weed Management Lab (1) Laboratory addressing practices and principles presented in 457 from the standpoint of turf.

(RE) Prerequisite(s): *Environmental and Soil Sciences 210*.

(RE) Corequisite(s): 457.

459 Agronomy Weed Management Lab (1) Laboratory addressing practices and principles presented in 457 from the standpoint of agronomy.

(RE) Prerequisite(s): *Environmental and Soil Sciences 210*.

(RE) Corequisite(s): 457.

460 Professional Practices in Landscape Construction and Management (3) Professionalism, salesmanship, proposals, bidding, estimating, specifications, and contract management in the landscape services industry. Computer technology applicable to landscape construction and contracting industry. Includes presentations by industry representatives.

(RE) Prerequisite(s): 350.

461 Statistics for Biological Research (3) Application of statistics to interpretation of biological research. Notation, descriptive statistics, probability, distributions, confidence intervals, t- and chi-square tests. Analysis of variance, mean separation procedures, and linear regression and correlation.

Credit Restriction: Students may not receive credit for both 461 and 561.

(RE) Prerequisite(s): *Mathematics 125 or Mathematics 152*.

469 Teaching Practicum (1-2) Supervised experience in teaching. May involve preparation of lectures and teaching aids, preparation and supervision of laboratory exercises, evaluation of student performance.

Repeatability: May be repeated. Maximum 2 hours.

Registration Restriction(s): Minimum student level – junior.

Registration Permission: Consent of instructor.

470 Professional Practices for the Green Industry (3) Professionalism, sales, sales proposals, budgeting, managerial skills, estimating, specifications, and contract management in the turf, public horticulture, and landscaping professions.

(RE) Prerequisite(s): 210.

(DE) Prerequisite(s): 226 or 230 or 240.

Registration Restriction(s): Minimum student level – senior.

480 Advanced Landscape Design (4) Comprehensive application of landscape design skills to a variety of project experiences with an emphasis on landscape planning and analysis, planting design, and materials estimating.

Contact Hour Distribution: Two 3-hour labs.

(RE) Prerequisite(s): 280 and 380.

485 Computer Aided Landscape Design (3) Overview of Computer Aided Design (CAD) as it relates to landscape design and construction. Emphasis on development of landscape design drawings through utilization of LANDCADD software.

(RE) Prerequisite(s): 380 and *Computer Science 100*.

492 Internship in Horticultural and Plant Sciences (1-3) Supervised work experience with a departmentally-approved employer within the ornamental horticulture, turfgrass, production horticulture, or field crop science industry.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 6 hours.

Registration Restriction(s): 2.25 GPA.

Registration Permission: Consent of instructor.

493 Problems in Horticultural and Plant Sciences (1-3) Supervised individual problems relating to the plant sciences or landscape design.

Repeatability: May be repeated. Maximum 6 hours.

Registration Permission: Consent of instructor.

494 Professional Horticultural Communications (3) Communication for public horticulturists through written, oral, and visual media. Emphasis on communication skills using proper writing techniques and grammar for print media, brochure design using desktop publishing, slide show development, oral presentations, and video use for educational and informational presentations in ornamental horticulture.

Registration Restriction(s): Minimum student level – senior.

497 Undergraduate Research Participation (1-3) Experiences in active research projects under supervision of staff members. Student should make arrangements for research project with instructor prior to enrollment.

Repeatability: May be repeated. Maximum 6 hours.

(RE) Restriction(s): Restriction(s): 3.00 GPA.

Registration Permission: Consent of instructor.

Political Science (801)

101 United States Government and Politics (3) Introduction to fundamental institutions and processes of American national politics including the Constitution, voting, the Presidency, the Congress and the courts.

102 Introduction to Political Science (3) Introduction to politics and political systems emphasizing government in a cross-national and global perspective. Focus on the knowledge and principal concerns of political science as a social science. (SS)

107 Honors: United States Government and Politics (3) Analysis and exploration of the American political system for students with superior ability.

Comment(s): 3.25 GPA required for current students; 29 ACT composite or 1250 SAT composite required for incoming students.

300 Introduction to Political Philosophy (3) An introduction to the concepts, enduring questions, and significant thinkers associated with political philosophy with specific attention to differing conceptions of human nature, politics, the state, civic obligation and rights, freedom, justice, and democracy.

311 Contemporary Issues in American Public Policy (3) Selected public policy issues confronting the nation, including the background, nature, and effects of present policies, and options for the future. Writing-emphasis course.

312 Popular Culture and American Politics (3) Popular culture related to American politics and government focusing on the role of film, television, fiction, music, drama, art, and sports. Writing-emphasis course. (Same as *American Studies 312*; *Cinema Studies 312*.)

315 Tennessee Government and Politics (3) Major elements in Tennessee government and politics.

320 State Government and Politics (3) Setting, institutions, and processes of government in the 50 states. Generalizations and comparisons with emphasis on federalism and intergovernmental relations.

321 Urban Politics and Process (3) Development of politics and policy-making in the modern American city.

330 Law in American Society (3) Law as a process through which social problems are addressed in the United States. Examples from case law, legislation, and administrative regulation. Writing-emphasis course. (Same as *Legal Studies 330*.)

340 Introduction to Public Administration and Public Policy (3) Public agencies, their organization, personnel, financial management, and administrative responsibility. The policy-making process and political environment.

341 Judicial Process and Policymaking (3) Courts as components of political systems and public policy-making through judicial decision-making. (Same as *Legal Studies 341*.)

350 Political Change in Developing Areas (3) Characteristics and problems of political changes with primary focus on developing areas. Writing-emphasis course.

361 Politics in Western Democracies (3) Political culture patterns and institutions of western democratic systems. Writing-emphasis course.

365 Introduction to International Relations (3) Resource availability, international economics, international security and peace (imperialism, war, diplomacy, the balance of power, international law, and international organization). Writing-emphasis course.

366 United States Foreign Policy Process (3) Processes whereby United States foreign policies are made and implemented, focusing on interaction within federal bureaucracy and roles of the President, Congress, the press, and public opinion.

370 Contemporary International Problems (3) Analysis of current international events.

374 American Political Thought (3) Major themes and ideas in American political thought related to the development of American political institutions, values, and practices. Writing-emphasis course.

387 Junior Honors Seminar (3) Required of students in honors concentration.

Registration Permission: Consent of department.