Entomology and Plant Pathology

Entomology and Plant Pathology enjoys a rich tradition in teaching, research and outreach activities as part of a land grant institution in Alabama. From the hiring of its first entomologist in 1896 and its first plant pathologist in 1903, the entomology and plant pathology program at AU has grown to its present faculty of entomologists and plant pathologists with teaching, research and extension responsibilities.

As a part of the College of Agriculture, the Entomology and Plant Pathology Department offers a broad range of both basic and applied courses at the undergraduate and graduate levels, providing a sound background for students considering careers in entomology, plant pathology, and related pest management areas. The curriculum is complemented by a diversity of courses in agricultural and biological sciences offered through departments in the University. The department offers undergraduate minors in Entomology and Plant Pathology. It also offers thesis and non-thesis master’s degrees and doctoral programs in these disciplinary areas.

 Majors
 • Applied Biotechnology (http://bulletin.auburn.edu/undergraduate/collegeofagriculture/entomologyandplantpathology/appliedbiotechnology_major)

 Minors
 • Entomology (http://bulletin.auburn.edu/undergraduate/collegeofagriculture/entomologyandplantpathology/entomology_minor)
 • Plant Pathology (http://bulletin.auburn.edu/undergraduate/collegeofagriculture/entomologyandplantpathology/plantpathology_minor)

 Applied Biotechnology Courses
 APBT 1000 INTRODUCTION TO APPLIED BIOTECHNOLOGY (1) LEC. 1. Introduction to the field of biotechnology including key concepts from biology, chemistry, and physics, and career opportunities.

 APBT 3100 APPLIED BIOTECHNOLOGY I (4) LEC. 2. LAB. 5. Pr. BIOL 1030 and APBT 1000. This course provides an overview of the basic cellular processes harnessed by biotechnology and an introduction to recombinant DNA and its applications. It combines lectures with labs to provide hands-on experience with molecular techniques, DNA cloning, and heterologous protein expression.

 APBT 4100 APPLIED BIOTECHNOLOGY II (4) LEC. 2. LAB. 4. Pr. BIOL 1030 and (BIOL 3000 or AGRI 3000) and APBT 3100. or instructor's approval. Principle and up-to-date advances of genetic modification of organisms; its practices and influences in a broad range of basic and applied sciences which have revolutionized "means" of sustainable agriculture.

 Entomology Courses
 ENTM 2000 PESTS, PATHOGENS, PARASITES, AND PEOPLE (3) LEC. 3. Past and present problems of pests and disease involving humans and the food chain.

 ENTM 2040/2043 INSECTS: AN INTRODUCTION TO ENTOMOLOGY (3) LEC. 3. Life processes, importance, and occurrence of insects.

 ENTM 3040 GENERAL ENTOMOLOGY (4) LEC. 3. LAB. 2. Pr. BIOL 1030 or BIOL 1037. Introduction to the biology and diversity of insects. An insect collection is required.

 ENTM 4020 ECONOMIC ENTOMOLOGY (4) LEC. 3. LAB. 2. Pr. BIOL 1030 or BIOL 1037. Consideration of the biological aspects, life histories and control of insects.

 ENTM 4920 ENTOMOLOGY INTERNSHIP (5) INT. 5. SU. Practical professional experience under the supervision of internship faculty and/or representatives of state, federal or private agency.

 ENTM 4960 SPECIAL PROBLEMS IN ENTOMOLOGY (1-3) IND. Credit to be arranged. Specialized project or research on a specific topic in entomology to be conducted under faculty supervision. Course may be repeated for a maximum of 3 credit hours.

 ENTM 4980 UNDERGRADUATE RESEARCH (2-4) IND. Departmental approval. Directed research in the area of specialty within the department. Course may be repeated for a maximum of 4 credit hours.
EN 4997 HONORS THESIS (1-6) IND. Pr. Honors College. Departmental approval. Course may be repeated for a maximum of 6 credit hours.

EN 5010 ENTOMOLOGY FOR EDUCATORS (4) LEC. 4. LAB. 3. Pr. BIOL 1030 or BIOL 1037. Biology and diversity of insects and related arthropods with applications for educators. An insect collection and an entomological exposition are required.

EN 5120 MEDICAL-VETERINARY ENTOMOLOGY (4) LEC. 3. LAB. 3. Pr. (BIOL 1030 or BIOL 1037) and (ENTM 3040 or ENTM 4020). or instructor approval. Students without the prerequisite ENTM course must be approved by the instructor or take ENTM 3040 or ENTM 4020 concurrently with ENTM 5120. Survey of insects, ticks, and mites of medical or veterinary importance, emphasizing role as vectors of disease agents and the biology of pathogen-transmission cycles. Labs focus on methods of vector sampling and surveillance, identification, and case studies of special topics. May count either ENTM 5120 or ENTM 6120.

EN 5140 AQUATIC INSECTS (4) LEC. 3. LAB. 3. Pr. ENTM 3040 or BIOL 4010. Biology and ecology of aquatic and semi-aquatic insects. Laboratory sessions focus on identification at the family and generic levels, and experience in collecting and field techniques.

EN 5150 ARACHNOLOGY (4) LEC. 3. LAB. 3. Pr. ENTM 3040. Biology, behavior and systematics of all arachnid groups, with major emphasis on spiders and mites.

EN 5220 INSECT ECOLOGY (4) LEC. 3. LAB. 3. Pr. BIOL 3060. Ecological interactions of insects and their environment, with emphasis on herbivory, predation, parasitism and mutualism, as well as population and community dynamics.

EN 5300 SYSTEMATIC ENTOMOLOGY (4) LEC. 3. LAB. 4. Pr. ENTM 3040 or ENTM 4020. Departmental approval. Learn to use the tools of the taxonomist to identify common families of insects. A collection is required. Field trips will be taken.

EN 5330 INTEGRATED PEST MANAGEMENT (4) LEC. 3. LAB. 2. Pr. ENTM 3040 or ENTM 4020. Integrated management of insects by environmental, biological, genetic, chemical and legal means.

EN 5360/5363 LANDSCAPE ENTOMOLOGY (4) LEC. 3. LAB. 3. Pr. (BIOL 1020 or BIOL 1027) or (BIOL 1030 or BIOL 1037). Identification and management of arthropod pests in the landscape. Recognition of pests and damage to trees, turf and ornamental plants.

EN 5370 URBAN ENTOMOLOGY (4) LEC. 3. LAB. 3. Pr. ENTM 3040 or ENTM 4020. Identification, biology and control of insect and other household arthropod pests.

EN 5440 INSECT MORPHOLOGY (4) LEC. 3. LAB. 4. Pr. ENTM 3040 and ENTM 4020. Departmental approval. Form and function in insects insects and related arthropods emphasizing morphological characteristics used in insect identification.

EN 5920 INTERNSHIP (3) IND. 3. SU. Departmental approval. Practical professional experience under the supervision of internship faculty and a representative of a state, federal, or private agency.

EN 6010 ENTOMOLOGY FOR EDUCATORS (4) LEC. 4. LAB. 3. Pr. BIOL 1030 or BIOL 1037. Biology and diversity of insects and related arthropods with applications for educators. An insect collection and an entomological exposition are required.

EN 6120 MEDICAL-VETERINARY ENTOMOLOGY (4) LEC. 3. LAB. 3. Survey of insects, ticks, and mites of veterinary importance, emphasizing role as vectors of disease agents and the biology of pathogen-transmission cycles. Labs focus on methods of vector sampling and surveillance, identification, and case studies of special topics. May count either ENTM 5120 or ENTM 6120.

EN 6140 AQUATIC INSECTS (4) LEC. 3. LAB. 3. Pr. ENTM 3040 or BIOL 4010. Departmental approval. Biology and ecology of aquatic and semi-aquatic insects. Laboratory sessions focus on identification at the family and generic levels, and experience in collecting and field techniques.

EN 6150 ARACHNOLOGY (4) LEC. 3. LAB. 3. Pr. ENTM 3040. Departmental approval. Biology, behavior and systematics of all arachnid groups, with major emphasis on spiders and mites.

EN 6220 INSECT ECOLOGY (4) LEC. 3. LAB. 3. Pr. BIOL 3060. Departmental approval. Ecological interactions of insects and their environment, with emphasis on herbivory, predation, parasitism and mutualism, as well as population and community dynamics.

EN 6300 SYSTEMATIC ENTOMOLOGY (5) LEC. 3. LAB. 6. Pr. ENTM 3040 or ENTM 4020. Departmental approval. Principles of systematics and identification of insects through orders, families, genera, and species. Collections are required. Credit will not be given for both ENTM 4300 and ENTM 7300.
ENTM 6330 INTEGRATED PEST MANAGEMENT (4) LEC. 3. LAB. 2. Pr. ENTM 3040 or ENTM 4020. Integrated management of insects by environmental, biological, genetic, chemical and legal means.

ENTM 6360/6366 LANDSCAPE ENTOMOLOGY (4) LEC. 3. LAB. 3. Pr. (BIOL 1020 or BIOL 1027) or (BIOL 1030 or BIOL 1037). Identification and management of arthropod pests in the landscape. Recognition of pests and damage to trees, turf and ornamental plants.

ENTM 6370 URBAN ENTOMOLOGY (4) LEC. 3. LAB. 3. Pr. ENTM 3040 or ENTM 4020. Identification, biology and control of insect and other household arthropod pests.

ENTM 6440 INSECT MORPHOLOGY (5) LEC. 3. LAB. 6. Pr. ENTM 3040 or ENTM 4020. Departmental approval. Comparative external anatomy and generalized internal structures of insects. Characteristics used in taxonomy will be emphasized. Credit will not be given for both ENTM 5440 and ENTM 6440.

ENTM 6920 INTERNSHIP (3) IND. 3. SU. Departmental approval. Practical professional experience under the supervision of internship faculty and a representative of a state, federal, or private agency.


ENTM 7190 PLANT AND ANIMAL INTERACTIONS (3) LEC. 3. Pr. BIOL 3060. Departmental approval. Ecological and evolutionary interrelationships emphasizing pollination biology, seed dispersal and plant-herbivore interactions.

ENTM 7200 INSECT PHYSIOLOGY (4) LEC. 3. LAB. 3. Pr. ENTM 3040. Departmental approval. Introduction to insect physiology stressing structure and function of each organ system. Methods used in physiological research will be emphasized.

ENTM 7330 MEDICAL-VETERINARY ENTOMOLOGY (4) LEC. 3. LAB. 3. Pr. ENTM 3040 or BIOL 6110. Departmental approval. Insects, mites, and other arthropods of medical or veterinary importance, identification of species, their biology and role as vectors of disease agents.

ENTM 7345 TROPICAL BIOLOGY: AN ECOLOGICAL APPROACH (8) LEC. 4. LAB. 12. Pr. At least 15 credits each with a minimum grade of B in BIOL 7000-7999. Departmental approval. The principles of ecology in the tropics.

ENTM 7900 DIRECTED STUDIES IN ENTOMOLOGY I (1-5) LEC. SU. Discussion groups on specific topics, assigned readings, on laboratory problems or field research. Course may be repeated for a maximum of 5 credit hours.

ENTM 7910 TEACHING PRACTICUM (1) LAB. 2. SU. Departmental approval. The teaching practicum will address the practical and heretical issues of laboratory learning and facilitating the skills of pedagogy. Course may be repeated for a maximum of 3 credit hours.

ENTM 7930 JOURNAL REVIEW FOR ENTOMOLOGY AND PLANT PATHOLOGY (1) LEC. 1. Pr. ENTM 3040 and ENTM 4020 or (PLPA 3000 or PLPA 3003). Discussion of recent scientific publications on basic aspects of research in entomology and plant pathology. Course may be repeated for a maximum of 2 credit hours.

ENTM 7950 SEMINAR (1) SEM. 1. SU. Presentation and discussion of scientific literature of thesis research findings. Required of all M.S. candidates.

ENTM 7960 ADVANCED SPECIAL PROBLEMS IN ENTOMOLOGY I (1-5) IND. Departmental approval. Specialized project or research on a specific topic in entomology to be conducted under faculty supervision. Course may be repeated for a maximum of 5 credit hours.

ENTM 7990 RESEARCH AND THESIS (1-10) MST. Topics may focus on technical laboratory problems or field research related to arthropod biology. Admission to the M.S. Program. Course may be repeated with change in topics.

ENTM 8900 DIRECTED STUDIES IN ENTOMOLOGY II (1-5) LEC. SU. Discussion groups on specific topics, assigned reading on laboratory problems or field research. Course may be repeated for a maximum of 5 credit hours.

ENTM 8910 TEACHING PRACTICUM (1-3) LAB. 2. SU. Departmental approval. Practical and theoretical issues of laboratory learning, and pedagogical facilitation. Required of all PhD students. Course may be repeated for a maximum of 3 credit hours.
ENTM 8930 JOURNAL REVIEW FOR ENTOMOLOGY AND PLANT PATHOLOGY (1) LEC. 1. Pr. ENTM 3040 and ENTM 4020 or (PLPA 3000 or PLPA 3003). Discussion of recent scientific publications on basic aspects of research in entomology and plant pathology. Course may be repeated for a maximum of 3 credit hours.

ENTM 8950 SEMINAR (1) LEC. 1. SU. Presentation and discussion of scientific literature or dissertation research findings. Required of all Ph.D. students.

ENTM 8960 ADVANCED SPECIAL PROBLEMS IN ENTOMOLOGY II (1-5) IND. Departmental approval. Credit to be arranged. Specialized project or research on a specific topic in entomology to be conducted under faculty supervision. Course may be repeated for a maximum of 5 credit hours.

ENTM 8990 RESEARCH AND DISSERTATION (1-10) DSR. Admission to the Ph.D. Program. Course may be repeated with change in topics.

Plant Pathology Courses

PLPA 2000 PESTS, PATHOGENS, PARASITES, AND PEOPLE (3) LEC. 3. Past and present problems of pests and disease involving humans and the food chain.

PLPA 3000/3003 GENERAL PLANT PATHOLOGY (4) LEC. 3. LAB. 2. Pr. BIOL 1030 or BIOL 1037. Survey of plant diseases common in Alabama, including symptom recognition, pathogen biology and management of plant diseases. Course credit will not be given for both PLPA 3000 and PLPA 3003/3004.

PLPA 4950 PROFESSIONAL DEVELOPMENT (1) LEC. 1. Development of professional skills required for modern careers in entomology, plant pathology and applied biotechnology.

PLPA 4960 SPECIAL PROBLEMS IN PLANT PATHOLOGY (1-3) IND. Departmental approval. Supervised work on a project in plant pathology. Areas of study are: A. Mycology; B. Nematology; C. Virology; D. Bacteriology; E. Extension and Clinic Experience; F. Physiological and Molecular Approaches. Course may be repeated for a maximum of 3 credit hours.

PLPA 4980 UNDERGRADUATE RESEARCH (2-4) IND. Departmental approval. Directed research in the area of specialty within the department. Course may be repeated for a maximum of 4 credit hours.

PLPA 4997 HONORS THESIS (1-3) IND. Pr. Honors College. Departmental approval. Assigned readings on topics pertinent to plant pathology or individual student endeavor consisting of directed research and writing of honor's thesis. Course may be repeated for a maximum of 6 credit hours.

PLPA 5050 PLANT DISEASE DIAGNOSIS (3) LEC. 1. LAB. 3. Pr. PLPA 3000 or PLPA 3003. Approaches, techniques, and practical experience in diagnosis of plant diseases. Credit will not be given for both PLPA 5050 and PLPA 6050. Summer.

PLPA 5060 PLANT DISEASE MANAGEMENT (3) LEC. 3. Pr. PLPA 3000 or PLPA 3003. Aspects of plant disease management including cultural practices, plant resistance, biological and chemical control, and disease forecasting. Spring.

PLPA 5200/5203 MYCOLOGY (4) LEC. 3. LAB. 2. Pr. BIOL 1030 or BIOL 1037. Biology of fungi with emphasis on taxonomy, morphology, physiology, genetics, reproduction, and how fungi interact with their ecosystems including plants, animals, and humans. Credit will only be given to one of the following: PLPA 5200, 5203, 6200, or 6206

PLPA 5300 PLANT-BACTERIAL INTERACTIONS (4) LEC. 3. LAB. 2. Pr. BIOL 1030. Department approval. Comprehensive review of plant-bacterial interactions, including colonization, pathogenesis, symbiotic and associative nitrogen fixation, and transformation. May count PLPA 5300 or PLPA 6300 or PLPA 7300.

PLPA 5400 PLANT VIROLOGY (3) LEC. 3. Pr. PLPA 3000 or PLPA 3003. Departmental approval. Introduction to plant viruses and the diseases they cause; virus particle structure and replication strategies; disease identification by symptoms and detection of pathogen; transmission, ecology, epidemiology and control.

PLPA 5500/5503 PLANT NEMATOLOGY (4) LEC. 2. LAB. 4. Pr. BIOL 1030 or BIOL 1037. Departmental approval. Presentation of nematodes in relation to plant diseases, identification of plant nematodes; nature of pathogenicity; principles and practices of management; recent advances in phytoneutology. May count either PLPA 5500 or PLPA 6500.
PLPA 5600 PHYSIOLOGY OF PLANT HEALTH AND DISEASE (3) LEC. 3. Pr. BIOL 3000 or BIOL 3003. Comprehensive coverage of present advances in plant defense-related metabolic pathways: how to recognize pathogen infections, and activate/potentiate disease resistances. Introduces biochemical, molecular and cellular mechanisms by which plants defend/assimilate themselves towards diverse a/biotic stress stimuli.

PLPA 5920 INTERNSHIP (3) IND. 3. SU. Departmental approval. Practical professional experience under the supervision of internship faculty and a representative of a state, federal, or private agency.

PLPA 6050 PLANT DISEASE DIAGNOSIS (3) LEC. 1. LAB. 3. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Experience with plant disease diagnosis procedures and the diagnosis of many common plant diseases. Summer.

PLPA 6060 PLANT DISEASE MANAGEMENT (3) LEC. 3. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Aspects of plant disease management including cultural practices, plant resistance, biological and chemical control, and disease forecasting. Spring.

PLPA 6200/6206 MYCOLOGY (4) LEC. 3. LAB. 2. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Biology of fungi with emphasis on taxonomy, morphology, physiology, genetics, reproduction, and how fungi interact with their ecosystems including plants, animals, and humans. Credit will only be given to one of the following: PLPA 5200, PLPA 5203, PLPA 6200 or PLPA 6206.

PLPA 6300 PLANT-BACTERIAL INTERACTIONS (4) LEC. 3. LAB. 2. Graduate level standing or Department approval. Comprehensive review of plant-bacterial interactions, including colonization, pathogenesis, symbiotic and associative nitrogen fixation, and transformation. May count either PLPA 5300 or PLPA 6300.

PLPA 6400 PLANT VIROLOGY (3) LEC. 3. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Introduction to plant viruses and the diseases they cause; virus particle structure and replication strategies; disease identification by symptoms and detection of pathogen; transmission, ecology, epidemiology and control.

PLPA 6500/6506 PLANT NEMATOLOGY (4) LEC. 2. LAB. 4. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Presentation of nematodes in relation to plant diseases, identification of plant nematodes; nature of pathogenicity; principles and practices of management; recent advances in phytonematology. May count either PLPA 5500 or PLPA 6500.

PLPA 6600 PHYSIOLOGY OF PLANT HEALTH AND DISEASE (3) LEC. 3. Pr. BIOL 3000 or BIOL 3003 or Departmental approval. Comprehensive coverage of present advances in plant defense-related metabolic pathways: how to recognize pathogen infections, and activate/potentiate disease resistances, biochemical, molecular and cellular mechanism by which plants defend/assimilate themselves towards diverse a/biotic stress stimuli. May count either PLPA 5600 or PLPA 6600.

PLPA 6920 INTERNSHIP (3) IND. 3. SU. Departmental approval. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Practical professional experience under the supervision of internship faculty and a representative of a state, federal, or private agency.

PLPA 7080 FIELD SURVEY OF PLANT PATHOLOGY (3) LEC. 1. LAB. 6. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Practical aspects of plant diseases under field conditions, on-site visits via field trips; discussion of experimental design for field research. Summer.

PLPA 7820 RESEARCH PROPOSAL WRITING (4) LEC. 3. Graduate level standing or Department approval. Experience in all aspects of writing and reviewing competitive research proposals through a workshop-format culminating in each student writing a proposal on research topics of their choosing. Fall.

PLPA 7866/7860 PLANT DISEASE EPIDEMIOLOGY (3) LEC. 3. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Aspects of plant disease epidemiology including disease assessment and temporal progress, pathogen spread, and yield loss determination.

PLPA 7861 PLANT DISEASE EPIDEMIOLOGY LABORATORY (2) LAB. 4. Coreq. PLPA 7860. Quantitative aspects of plant disease epidemiology including spatial and temporal modeling, and disease system simulation.

PLPA 7900 DIRECTED STUDIES IN PLANT PATHOLOGY (1-5) LEC. SU. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Discussion groups on specific topics, assigned reading on laboratory problems or field research. Course may be repeated for a maximum of 5 credit hours.
PLPA 7910 TEACHING PRACTICUM (1) LAB. 2. SU. Graduate level standing in PLPA or ENTM or Departmental approval. The teaching practicum will address the practical and heretical issues of laboratory learning and facilitating the skills of pedagogy. Course may be repeated for a maximum of 3 credit hours.

PLPA 7930 JOURNAL REVIEW FOR ENTOMOLOGY AND PLANT PATHOLOGY (1) LEC. 1. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Discussion of recent scientific publications on basic aspects of research in entomology and plant pathology. Course may be repeated for a maximum of 2 credit hours.

PLPA 7950 SEMINAR (1) SEM. 1. SU. Departmental approval. Seminar presentations on current departmental research and current issues in plant pathology and related disciplines. Fall, Spring. Course may be repeated for a maximum of 2 credit hours.

PLPA 7960 SPECIAL PROBLEMS IN PLANT PATHOLOGY (1-5) IND. Departmental approval. Credit to be arranged. Specialized project or research on a specific topic in plant pathology to be conducted under faculty supervision. Course may be repeated for a maximum of 5 credit hours.

PLPA 7990 RESEARCH AND THESIS (1-10) MST. Departmental approval. Research and thesis on problems in plant pathology. Course may be repeated with change in topics.

PLPA 8880 PHYSIOLOGICAL AND MOLECULAR PLANT PATHOLOGY (3) LEC. 2. LAB. 2. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval Comprehensive coverage of the molecular biology of plant-pathogen interactions.

PLPA 8900 DIRECTED STUDIES IN PLANT PATHOLOGY (1-5) LEC. SU. Discussion groups on specific topics, assigned reading on laboratory problems or field research. Course may be repeated for a maximum of 5 credit hours.

PLPA 8910 TEACHING PRACTICUM (1-3) LAB. 2. SU. Departmental approval. Practical and theoretical issues of laboratory learning, and pedagogical facilitation. Required of all PhD students. Course may be repeated for a maximum of 3 credit hours.

PLPA 8930 JOURNAL REVIEW FOR ENTOMOLOGY AND PLANT PATHOLOGY (1) LEC. 1. Graduate level standing in PLPA, ENTM, AGRO, HORT, AGEC or Department approval. Discussion of recent scientific publications on basic aspects of research in entomology and plant pathology. Course may be repeated for a maximum of 3 credit hours.

PLPA 8950 SEMINAR (1) SEM. 1. SU. Departmental approval. Presentations and discussion of scientific literature or dissertation research findings. Required for all Ph.D. candidates. Fall, Spring. Course may be repeated for a maximum of 2 credit hours.

PLPA 8960 SPECIAL PROBLEMS IN PLANT PATHOLOGY (1-5) IND. Departmental approval. Credit to be arranged. Specialized project or research on a specific topic in plant pathology to be conducted under faculty supervision. Course may be repeated for a maximum of 5 credit hours.

PLPA 8990 RESEARCH AND DISSERTATION (1-10) DSR. Departmental approval. Research and dissertation on problems in plant pathology. Course may be repeated with change in topics.