

# Entomology and Plant Pathology (ENPL)

Kenneth Korth  
Department Head  
217 Plant Sciences Building  
479-575-2445  
Email: [kkorth@uark.edu](mailto:kkorth@uark.edu)

Ioannis Tzanetakis  
Graduate Coordinator  
217 Plant Sciences Building  
479-575-3180  
Email: [itzaneta@uark.edu](mailto:itzaneta@uark.edu) ([kkorth@uark.edu](mailto:kkorth@uark.edu))

Department email: [enpl@uark.edu](mailto:enpl@uark.edu)

Department of Entomology and Plant Pathology (<https://enpl.uark.edu>)

## Degrees Conferred:

M.S. in Entomology and Plant Pathology with Entomology Concentration (ENPLMS)

M.S. in Entomology and Plant Pathology with Plant Pathology Concentration (ENPLMS)

Ph.D. in Agricultural, Food and Life Sciences with Entomology Concentration (AFLSPH-ENTO)

Ph.D. in Agricultural, Food and Life Sciences with Plant Pathology Concentration (AFLSPH-PLPA)

**Primary Areas of Faculty Research:** Research areas are diverse, including fundamental studies emphasizing arthropod biology, pathogens of plants, ecology and pest management, as well as mission-oriented research aimed at solving specific problems. Research includes field and lab-based approaches utilizing host and pest genetics, molecular biology, taxonomy, systematics, and management strategies.

Requirements for M.S. in ENPL with Entomology Concentration

**Requirements for the Master of Science Degree:** Students studying for the Master of Science degree with a limited undergraduate background in entomology may be expected to complete more than the minimum number of 30 credit hours required for the degree.

A thesis, reporting of original research, and a final comprehensive oral examination also are required.

Specific requirements follow:

**General Course Requirements:** The degree program and coursework for each candidate will be arranged on an individual basis. M.S. students must register for a minimum of 30 hours of graduate credit including 6 thesis hours.

**Prerequisite Requirements:** ENTO 30103. Introductory Entomology (Fa) or its equivalent. 3 hours.

**Core Course Requirements:** The student must take or have taken courses equivalent to:

ENTO 50204	Insect Diversity and Taxonomy	4
ENTO 50503	Insect Ecology	3

ENTO 51503	Insect Pest Management	3
ENTO 61103	Insect Physiology and Molecular Biology	3

A course in statistics for graduate credit is also required.

**Seminar Requirements:** Two semester hours of seminar are required. Seminar hours may be taken in Entomology (ENPL 60701) or, with Department Head approval, as a formal for-credit seminar offered in another department within the university. In addition, each student is required to present a seminar on his/her thesis research plans during the first year of the degree program and an exit seminar on the thesis research prior to leaving the program.

**Residence Requirements:** A minimum of 30 weeks in residence is required for the M.S. degree.

**Grade Point Average Requirement:** A minimum 3.00 GPA must be maintained. If the cumulative GPA falls below 3.00, or research or general academic progress is unsatisfactory, the student's performance will be re-evaluated by the Advisory Committee and a recommendation made on continued status as a graduate student. For details about this process, please see the Graduate Student Handbook on the departmental website.

**Comprehensive Examination:** A comprehensive oral examination covering coursework and defense of the thesis research is required. The examination is generally taken during the student's final semester.

Students should also be aware of Graduate School requirements with regard to master's degrees (<http://catalog.uark.edu/graduatecatalog/degree requirements/#mastersdegree text>).

## Entomology Concentration Core Course Requirements (13 hours)

ENTO 50204	Insect Diversity and Taxonomy	4
ENTO 50503	Insect Ecology	3
ENTO 51503	Insect Pest Management	3
ENTO 61103	Insect Physiology and Molecular Biology	3

A course in statistics for graduate credit is also required.

## Requirements for M.S. in ENPL with Plant Pathology Concentration

**Requirements for the Master of Science Degree:** Students studying for the Master of Science degree with a limited undergraduate background in entomology may be expected to complete more than the minimum number of 30 credit hours required for the degree.

A thesis, reporting of original research, and a final comprehensive oral examination also are required.

Specific requirements follow:

**General Course Requirements:** The degree program and coursework for each candidate will be arranged on an individual basis. M.S. students must register for a minimum of 30 hours of graduate credit including 6 thesis hours.

**Prerequisite Requirements:** ENTO 30103. Introductory Entomology (Fa) or its equivalent. 3 hours.

**Core Course Requirements:** The student must take or have taken courses equivalent to:

ENTO 50204	Insect Diversity and Taxonomy	4
ENTO 50503	Insect Ecology	3
ENTO 51503	Insect Pest Management	3
ENTO 61103	Insect Physiology and Molecular Biology	3

A course in statistics for graduate credit is also required.

**Seminar Requirements:** Two semester hours of seminar are required. Seminar hours may be taken in Entomology (ENPL 60701) or, with Department Head approval, as a formal for-credit seminar offered in another department within the university. In addition, each student is required to present a seminar on his/her thesis research plans during the first year of the degree program and an exit seminar on the thesis research prior to leaving the program.

**Residence Requirements:** A minimum of 30 weeks in residence is required for the M.S. degree.

**Grade Point Average Requirement:** A minimum 3.00 GPA must be maintained. If the cumulative GPA falls below 3.00, or research or general academic progress is unsatisfactory, the student's performance will be re-evaluated by the Advisory Committee and a recommendation made on continued status as a graduate student. For details about this process, please see the Graduate Student Handbook on the departmental website.

**Comprehensive Examination:** A comprehensive oral examination covering coursework and defense of the thesis research is required. The examination is generally taken during the student's final semester.

Students should also be aware of Graduate School requirements with regard to master's degrees ([http://catalog.uark.edu/graduatecatalog/degree\\_requirements/#mastersdegree\\_text](http://catalog.uark.edu/graduatecatalog/degree_requirements/#mastersdegree_text)).

#### Plant Pathology Concentration Core Course Requirements (13 hours)

PLPA 52203	Plant Disease Control	3
PLPA 53003	Advanced Plant Pathology: Host-Pathogen Interactions	3
PLPA 53103	Advanced Plant Pathology: Ecology and Epidemiology	3
PLPA 54004	Diseases of Economic Crops	4

A course in statistics for graduate credit is also required.

### Requirements for Ph.D. in AFLS with Entomology Concentration

**Prerequisites to Degree Program:** A Master of Science degree is desirable. A student with a Bachelor of Science and an exceptional record in academics and/or research may be approved for admission to the Ph.D. program in Agricultural, Food and Life Sciences if the Graduate Student Concentration Admissions Committee of the desired concentration deems them qualified and approval is granted by the AFLSPH Steering Committee. A student admitted to the University of Arkansas, pursuing an M.S. and in good academic standing may apply to be admitted to the doctoral program and forgo completing the M.S. degree if so approved by the AFLSPH Steering Committee and the AFLSPH Graduate Concentration Admissions Committee. A minimum grade point average of 3.00 (on a 4.00 scale) on previous college-level course work is required.

**Admission Requirements for Entry:** To be considered for admission, a student must submit a letter of intent, along with the application for

admission indicating the desired degree concentration, areas of interest and career goals. Official transcripts of all previous college-level course work must be submitted. Three letters of recommendation are required. These letters should address the character and academic capability of the applicant. Applications will first be reviewed by the AFLSPH Steering Committee which will assign the student to the appropriate Graduate Student Concentration Admissions Committee for review. The Concentration Admissions Committee will make the final determination of admittance into the AFLSPH program and the concentration.

**Requirements for Doctor of Philosophy Degree:** The Ph.D. program in Agricultural, Food and Life Sciences requires a minimum of 72 credit hours after a Bachelor of Science or Bachelor of Arts degree or a minimum of 42 hours after a Master of Science or Master of Arts degree.

General course requirements for each degree candidate are arranged on an individual basis by the Faculty Adviser, the Graduate Advisory Committee and the candidate in accordance with guidelines of their concentration. Alternate courses may be selected at the discretion of the committee.

All students must complete 6 hours of elective course hours and 2 hours of seminar. One seminar must be a research proposal presentation and the other must be an exit seminar presenting the dissertation research results. All students must complete 18 hours of doctoral dissertation hours. Students entering the doctoral program with only a B.S. or B.A. must also complete an additional 30 hours (to reach the 72 hour post B.S./B.A. requirement). Students must satisfactorily pass written and oral candidacy examinations covering their discipline and supporting areas. These examinations must be completed at least one year before completion of the Ph.D. degree program in Agricultural, Food and Life Sciences. Each candidate must complete a doctoral dissertation on an important research topic in the concentration field. The specific problem and subject of the dissertation is determined by the faculty adviser, the student and the Graduate Advisory Committee. A dissertation title must be submitted to the dean of the Graduate School at least one year before the dissertation defense. Provisional approval of the dissertation must be given by all members of the Graduate Advisory Committee prior to the dissertation defense. Students must pass the oral defense and examination of the dissertation given by the Graduate Advisory Committee. A student cannot be approved for conferral of the doctoral degree until after completion of all coursework, written and oral candidacy exams, the defense passed and dissertation accepted by the Graduate School and an application for the degree has been filed with the Registrar's Office and the fee paid.

### Additional Requirements for Entomology Concentration

In addition to the general requirements for the Ph.D. program in Agricultural, Food and Life Sciences, students in the Entomology concentration must complete:

ENTO 50204	Insect Diversity and Taxonomy	4
ENTO 50503	Insect Ecology	3
ENTO 51503	Insect Pest Management	3
ENTO 61103	Insect Physiology and Molecular Biology	3
AGST 50104	Experimental Design	4

## Requirements for Ph.D. in AFLS with Plant Pathology Concentration

**Prerequisites to Degree Program:** A Master of Science degree is desirable. A student with a Bachelor of Science and an exceptional record in academics and/or research may be approved for admission to the Ph.D. program in Agricultural, Food and Life Sciences if the Graduate Student Concentration Admissions Committee of the desired concentration deems them qualified and approval is granted by the AFLSPH Steering Committee. A student admitted to the University of Arkansas, pursuing an M.S. and in good academic standing may apply to be admitted to the doctoral program and forgo completing the M.S. degree if so approved by the AFLSPH Steering Committee and the AFLSPH Graduate Concentration Admissions Committee. A minimum grade point average of 3.00 (on a 4.00 scale) on previous college-level course work is required.

**Admission Requirements for Entry:** To be considered for admission, a student must submit a letter of intent, along with the application for admission indicating the desired degree concentration, areas of interest and career goals. Official transcripts of all previous college-level course work must be submitted. Three letters of recommendation are required. These letters should address the character and academic capability of the applicant. Applications will first be reviewed by the AFLSPH Steering Committee which will assign the student to the appropriate Graduate Student Concentration Admissions Committee for review. The Concentration Admissions Committee will make the final determination of admittance into the AFLSPH program and the concentration.

**Requirements for Doctor of Philosophy Degree:** The Ph.D. program in Agricultural, Food and Life Sciences requires a minimum of 72 credit hours after a Bachelor of Science or Bachelor of Arts degree or a minimum of 42 hours after a Master of Science or Master of Arts degree.

General course requirements for each degree candidate are arranged on an individual basis by the Faculty Adviser, the Graduate Advisory Committee and the candidate in accordance with guidelines of their concentration. Alternate courses may be selected at the discretion of the committee.

All students must complete 6 hours of elective course hours and 2 hours of seminar. One seminar must be a research proposal presentation and the other must be an exit seminar presenting the dissertation research results. All students must complete 18 hours of doctoral dissertation hours. Students entering the doctoral program with only a B.S. or B.A. must also complete an additional 30 hours (to reach the 72 hour post B.S./B.A. requirement). Students must satisfactorily pass written and oral candidacy examinations covering their discipline and supporting areas. These examinations must be completed at least one year before completion of the Ph.D. degree program in Agricultural, Food and Life Sciences. Each candidate must complete a doctoral dissertation on an important research topic in the concentration field. The specific problem and subject of the dissertation is determined by the faculty adviser, the student and the Graduate Advisory Committee. A dissertation title must be submitted to the dean of the Graduate School at least one year before the dissertation defense. Provisional approval of the dissertation must be given by all members of the Graduate Advisory Committee prior to the dissertation defense. Students must pass the oral defense and examination of the dissertation given by the Graduate Advisory Committee. A student cannot be approved for conferral of the doctoral degree until after completion of all coursework, written and oral candidacy exams, the defense passed and dissertation accepted by the

Graduate School and an application for the degree has been filed with the Registrar's Office and the fee paid.

In addition to the general requirements for the Ph.D. program in Agricultural, Food and Life Sciences, students in the Plant Pathology concentration must also complete:

ENPL 50001	Seminar on Presentation Skills	1
PLPA 53003	Advanced Plant Pathology: Host-Pathogen Interactions	3
PLPA 53103	Advanced Plant Pathology: Ecology and Epidemiology	3
PLPA 54004	Diseases of Economic Crops	4
One course from the following:		3
PLPA 52203	Plant Disease Control	
PLPA 56003	Plant Pathogenic Fungi	
PLPA 62003	Plant Virology	

**Adams, Reichard**, Ph.D. (University of Texas-Arlington), B.S. (Stephen F. Austin State University), Assistant Professor, 2023.

**Bateman, Nick**, Ph.D. (Mississippi State University), B.S. (University of Arkansas-Monticello), Associate Professor, 2016, 2022.

**Bluhm, Burt H.**, Ph.D., M.S. (Purdue University), B.S. (University of Oklahoma), Associate Professor, 2008, 2014.

**Clay, Natalie**, Ph.D. (University of Oklahoma Norman), Associate Professor, 2023.

**Correll, Jim**, Ph.D., M.S. (University of California-Berkeley), B.S. (Pennsylvania State University), Distinguished Professor, 1989, 2018.

**Dowling, Ashley Patrick Gregg**, Ph.D. (University of Michigan-Ann Arbor), B.S. (University of Arizona), Professor, 2008, 2019.

**Egan, Martin J.**, Ph.D., B.Sc. (University of Exeter, United Kingdom), Associate Professor, 2016, 2022.

**Faske, Travis**, Ph.D. (Texas A&M University), M.S. (Oklahoma State University), B.S. (Tarleton State University), Professor, 2015, 2020.

**Goggin, Fiona**, Ph.D. (University of California-Davis), B.S. (Cornell University), Professor, 2001, 2011.

**Jones, Austin**, Ph.D. (University of Arkansas), Instructor, 2021.

**Joshi, Neelendra**, Ph.D. (Pennsylvania State University), Associate Professor, 2015, 2020.

**Kariyat, Rupesh**, Ph.D. (Pennsylvania State University), M.S. (University of Wyoming), B.S. (Kerala Agricultural University), Associate Professor, 2021.

**Korth, Ken L.**, Ph.D. (North Carolina State University), B.S. (University of Nebraska), Professor, 1999, 2009.

**Kud, Joanna "Asia"**, Ph.D. (University of Idaho), M.S. (Maria Curie-Skłodowska University), Assistant Professor, 2022.

**Loftin, Kelly M.**, Ph.D. (New Mexico State University), M.S. (University of Arkansas), B.S. (Arkansas Tech), Professor, 1998, 2010.

**McDermott, Emily**, Ph.D. (University of California-Riverside), B.S. (The Ohio State University), Assistant Professor, 2020.

**Nicolli, Camila**, Ph.D. (Universidade Federal de Lavras, Brazil), Assistant Professor, 2023.

**Rupe, John C.**, Ph.D., M.S. (University of Kentucky), B.S. (Colorado State University), University Professor, 1984, 2019.

**Spradley, Ples**, B.A. (University of Arkansas at Little Rock), Associate Professor, 2004.

**Spurlock, Terry**, Ph.D. (University of Arkansas), Extension Associate Professor, 2015.

**Studebaker, Glenn**, Ph.D., M.S. (University of Arkansas), B.S. (Missouri Southern State University), Associate Professor, 1993.

**Szalanski, Allen Lawrence**, Ph.D. (University of Nebraska-Lincoln), M.S. (Kansas State University), B.S. (University of Manitoba), Professor, 2001, 2011.

**Thrash, Ben**, Ph.D. (Mississippi State University), M.A., B.S.A. (University of Arkansas), Assistant Professor, 2018.

**Tzanetakis, Ioannis E.**, Ph.D. (Oregon State University), M.S., B.S. (Agricultural University of Athens, Greece), Professor, 2008, 2016.

**Zawislak, Jon**, Ph.D., M.S., B.S. (University of Arkansas), Assistant Professor, 2022.

## Entomology Courses

### ENTO 5000V. Special Problems. 1-4 Hour.

Special problems. Prerequisite: Graduate standing. (Typically offered: Fall, Spring and Summer) May be repeated for up to 4 hours of degree credit.

### ENTO 50103. Morphology of Insects. 3 Hours.

Origin, evolution, and functional significance of external insect structure. Structure and function of major internal systems. Previous knowledge of basic entomology is helpful, but not required. Lecture 2 hours, laboratory 4 hours per week. Corequisite: Lab component. (Typically offered: Fall Odd Years)

### ENTO 50204. Insect Diversity and Taxonomy. 4 Hours.

Principles and practices of insect classification and identification with emphasis on adult insects. 2.5 hours lecture, 4 hours lab. Prerequisite: ENTO 30103 or instructor consent. Corequisite: Lab component. (Typically offered: Fall)  
This course is cross-listed with BIOL 50274.

### ENTO 50403. Honey Bee Biology and Beekeeping. 3 Hours.

To acquaint the student with social insects in general and honey bees in particular, to promote an interest in beekeeping as a hobby, occupation, and/or science, to give the students the basic knowledge of how to keep honey bees, and to increase awareness of the contribution that pollinating insects make to agriculture, natural ecosystems, and human life. (Typically offered: Spring)

### ENTO 50503. Insect Ecology. 3 Hours.

To develop an understanding of important ecological concepts through study of dynamic relationships among insects and their environment. To become familiar with the literature of insect ecology, and interpretation and critique of ecological research. Previous knowledge of basic entomology and/or ecology will be assumed. 2 hours lecture/2 hours lab. Prerequisite: Instructor consent. Corequisite: Lab component. (Typically offered: Fall Even Years)  
This course is cross-listed with BIOL 50573.

### ENTO 50603. Medical and Veterinary Entomology. 3 Hours.

Medical and veterinary entomology is the study of how insects and other arthropods affect human and animal health. Many insects, along with ticks and mites, require blood in order to develop their eggs, and in the process of feeding can transmit harmful pathogens. Even without disease, their bites can be painful and annoying. Other insects inject toxic venoms with their bites and stings that can cause allergic reactions or death. Some even lay eggs and grow inside of their live hosts. This class will cover the different groups medically important arthropods and the ways in which they cause direct or indirect injury to humans and animals. We will cover the disease cycles of relevant vector-borne pathogens, as well as surveillance and control. Students will learn to identify medically important arthropods and gain exposure to techniques and tools used in the field of medical and veterinary entomology. Corequisite: Lab component. (Typically offered: Spring)

### ENTO 5100V. Special Topics. 1-3 Hour.

Topics not covered in other courses or a more intensive study of specific topics in entomology. (Typically offered: Irregular) May be repeated for degree credit.

### ENTO 51103. Insect Behavior and Chemical Ecology. 3 Hours.

Basic concepts in insect senses and patterns of behavioral responses to various environmental stimuli. Previous knowledge of basic entomology is helpful, but not required. Prerequisite: Instructor consent. Corequisite: Lab component. (Typically offered: Spring Even Years)

This course is cross-listed with BIOL 51173.

### ENTO 51203. Biological Control. 3 Hours.

Theoretical and practical basis for biological control of arthropod pests and weeds via parasites, predators, and pathogens. Lecture 2 hours, laboratory 2 hours per week. Corequisite: Lab component. (Typically offered: Fall Odd Years)

### ENTO 51503. Insect Pest Management. 3 Hours.

Study of principles and concept of insect pest management. Areas covered include a survey of arthropod pests and damage, population dynamics, damage thresholds, physiological units, prediction models, surveillance, arthropod sampling, strategies and tactics utilized to maintain pest populations below economic injury levels. Prerequisite: Instructor consent. (Typically offered: Spring Odd Years)

### ENTO 51603. Advanced Applied Entomology. 3 Hours.

Topics will include the integration of tactics, integration of disciplines and specific case histories in insect management, or use of insects to manage weeds. Prerequisite: Instructor consent. (Typically offered: Spring Even Years)

### ENTO 6000V. Master's Thesis. 1-6 Hour.

Master's Thesis. Prerequisite: Graduate standing. (Typically offered: Fall, Spring and Summer) May be repeated for degree credit.

### ENTO 61103. Insect Physiology and Molecular Biology. 3 Hours.

Overview of insect physiology and modern molecular techniques to study physiological processes. Previous knowledge of basic entomology is helpful, but not required. Two lectures per week (1 hour 20 minutes each). (Typically offered: Spring Even Years)

### ENTO 7000V. Doctoral Dissertation. 1-18 Hour.

Doctoral Dissertation. Prerequisite: Graduate standing. (Typically offered: Fall, Spring and Summer) May be repeated for degree credit.

## Entomology and Plant Pathology Courses

### ENPL 50001. Seminar on Presentation Skills. 1 Hour.

First-year graduate students prepare an entrance seminar on their research plan and deliver it within the context of the departmental seminar series. The instructor of record and the students' major advisors provide guidance on seminar development, and students work together to practice their presentations prior to their seminar dates. Prerequisite: Graduate standing. (Typically offered: Fall and Spring)

### ENPL 60701. Colloquium - Advanced Topics in Entomology and Plant Pathology. 1 Hour.

Rotating topics not covered in regular course work, including critical review of research papers in entomology or plant pathology and professional development as it applies to careers in these fields. Prerequisite: Graduate standing. (Typically offered: Fall and Spring) May be repeated for up to 6 hours of degree credit.

## Plant Pathology Courses

### PLPA 5020V. Special Problems Research. 1-6 Hour.

Original investigations of assigned problems in plant pathology. Prerequisite: Graduate standing. (Typically offered: Fall, Spring and Summer) May be repeated for up to 6 hours of degree credit.

### PLPA 5040V. Special Topics. 1-18 Hour.

Lecture topics of current interest not covered in other courses in plant pathology or other related areas. Prerequisite: Graduate standing. (Typically offered: Irregular) May be repeated for up to 18 hours of degree credit.



**PLPA 52203. Plant Disease Control. 3 Hours.**

Principles, methods and mechanics of plant disease control. Emphasis is given to the integration of control measures and epidemiology of plant diseases. Lecture 3 hours per week. Graduate degree credit will not be given for both PLPA 42203 and PLPA 52203. (Typically offered: Fall)

**PLPA 53003. Advanced Plant Pathology: Host-Pathogen Interactions. 3 Hours.**

Presentation of important contemporary concepts relative to disease resistance and the physiology, biochemistry, and molecular biology of plant-pathogen interactions. Lecture 3 hours per week. Prerequisite: PLPA 30003 or equivalent and graduate standing. (Typically offered: Spring Odd Years)

**PLPA 53103. Advanced Plant Pathology: Ecology and Epidemiology. 3 Hours.**

Presentation of important contemporary concepts relative to the ecology and epidemiology of foliar and soil-borne plant pathogens. Lecture 3 hours per week. Prerequisite: PLPA 30003 and graduate standing. (Typically offered: Spring Even Years)

**PLPA 53303. Biotechnology in Agriculture. 3 Hours.**

Discussion of the techniques, applications, and issues of biotechnology as it is being used in modern agriculture. Coverage includes the basics of molecular biology, production of transgenic plants and animals, and new applications in the agricultural, food, and medical marketplace. Lecture and discussion, 3 hours per week. Graduate degree credit will not be given for both PLPA 43303 and PLPA 53303. (Typically offered: Fall)

**PLPA 54004. Diseases of Economic Crops. 4 Hours.**

Diagnosis and management of important diseases of cotton, fruits, rice, trees, soybeans, wheat, and vegetables will be covered in a lecture, laboratory, and field format. Lecture 2 hours, laboratory 4 hours per week. Four 1-day field trips will be involved. Corequisite: Lab component. Prerequisite: PLPA 30003. (Typically offered: Summer)

**PLPA 56003. Plant Pathogenic Fungi. 3 Hours.**

Plant Pathogenic Fungi is structured as an integrated lecture/laboratory class designed for students that are interested in developing an understanding and appreciation for taxonomy, biology, and ecology of plant pathogenic fungi and related saprophytic fungi. Corequisite: Lab component. Prerequisite: PLPA 30003 or graduate standing. (Typically offered: Fall Odd Years)

**PLPA 6000V. Master's Thesis. 1-6 Hour.**

Master's Thesis. Prerequisite: Graduate standing. (Typically offered: Fall, Spring and Summer) May be repeated for degree credit.

**PLPA 62003. Plant Virology. 3 Hours.**

Lecture emphasizing discussion of recent advances in plant virology. Laboratory concerned with techniques and equipment used in plant virus studies, including transmission of viruses, characterization utilizing ultracentrifugation, spectrophotometry, electrophoresis, electron microscopy, and serology. Lecture 2 hours, laboratory 3 hours per week. Corequisite: Lab component. Prerequisite: CHEM 58103 or CHEM 58403 or CHEM 68703 or consent of instructor. (Typically offered: Fall Even Years)