

# Davis College of Agriculture and Natural Resources

---

## Degrees Offered

- Master of Agriculture
- Master of Science
- Master of Science in Forestry
- Doctor of Philosophy

As WVU's oldest academic unit, the Davis College is central to the University's mission to advance the people and places of West Virginia and beyond. The College offers a wide range of undergraduate and graduate degree programs that cover life sciences, applied and basic research, and economic and social relationships among people as they live and work in a wide variety of settings. With an extensive research portfolio in areas related to food, water quality, natural resource management, and community development, the College is a leader in making discoveries that change lives as it works toward the vision of a world sustainably fed, clothed, and housed.

The Davis College is named for two Morgantown sisters, Gladys Gwendolyn Davis and Vivian Davis-Michael, in recognition of their \$18.4 million gift. The College offers 13 undergraduate majors, as well as 11 masters programs and 6 doctoral degree programs. It maintains thousands of acres of farmland and forests throughout the state which provide opportunities for learning beyond the classroom, research and facilitate valuable community service.

---

## ADMINISTRATION

### DEAN

- Jorge H. Atiles - Ph.D. (Virginia Tech University)  
Director, West Virginia Agricultural and Forestry Experiment Station, Director, WVU Division for Land Grant Engagement

### ASSOCIATE DEAN FOR ACADEMIC AFFAIRS

- Kimberly M. Barnes - PhD (University of Nebraska)

### ASSOCIATE DEAN FOR RESEARCH AND OUTREACH

- Jason Hubbart - Ph.D. (University of Idaho)  
Associate Director, West Virginia Agricultural and Forestry Experiment Station

### SCHOOL/DIVISION DIRECTORS

- Christopher Ashwell - Ph.D. (Wake Forest University)  
School of Agriculture and Food Systems
- Jessica Blythe - Ph.D. (University of Florida)  
School of Community and Economic Development
- Amy Welsh - Ph.D. (University of California - Davis)  
School of Natural Resources and the Environment

## Admissions

### REGULAR

A regular graduate student is a degree-seeking student who meets all of the criteria for regular admission to a program of his/her choice. The student must possess a baccalaureate degree from a college or university, have at least a grade point average of 2.75 on a 4.0 scale (or an average of 3.0 or higher for the last sixty credit hours), meet all criteria established by the degree program, and be under no requirements to make up deficiencies.

The student must:

- Have an adequate academic aptitude at the graduate level as measured by the Graduate Record Examination (GRE) or the New Medical College Admissions Test (New MCAT) for some programs.
- Provide three letters of reference from persons acquainted with the applicant's professional work, experience, or academic background.
- Submit a written statement of 500 words or more indicating the applicant's goals and objectives relative to receiving a graduate degree.

- International applicants must submit proof of English language proficiency (<https://admissions.wvu.edu/how-to-apply/international-students/english-language-proficiency-requirements/>).
- The specific graduate programs may have additional requirements for admission.

## PROVISIONAL

A student may be admitted as a provisional graduate student when the student possesses a baccalaureate degree but does not meet the criteria for regular admission. The student may have incomplete credentials, deficiencies to make up, or may have an undergraduate scholastic record that does not meet grade point requirements for regular admission. After successful fulfillment of the deficiencies, the student will be granted regular graduate student status.

## NON-DEGREE

A non-degree student is a student not admitted to a program. Admission as a non-degree student does not guarantee admission to any course or program.

A student must present evidence of a baccalaureate degree. A maximum of twelve credit hours of work as a non-degree student may be applied to a graduate degree if the student is later accepted into a graduate program.

## Certificate Program

- GIS and Spatial Analysis (<http://catalog.wvu.edu/graduate/graduatecertificates/gisandspatialanalysis/>)
- Sustainable Trails Development ([http://catalog.wvu.edu/graduate/graduatecertificates/sustainable\\_trails\\_dev/](http://catalog.wvu.edu/graduate/graduatecertificates/sustainable_trails_dev/))
- Animal and Veterinary Science (A&VS) (p. 2)
- Applied and Environmental Microbiology (AEM) (p. 4)
- Agriculture, Forestry, and Consumer Sciences (AFCS) (p. 4)
- Agricultural Biochemistry (AGBI) (p. 5)
- Agriculture and Extension Education (AGEE) (p. 7)
- Agriculture (AGRL) (p. 9)
- Agronomy (AGRN) (p. 10)
- Animal Nutrition (ANNU) (p. 11)
- Animal Physiology (ANPH) (p. 12)
- Animal Production (ANPR) (p. 13)
- Agriculture Natural Resources and Design (ANRD) (p. 14)
- Agriculture and Resource Economics (ARE) (p. 14)
- Energy Land Management (ENLM) (p. 16)
- Entomology (ENTO) (p. 16)
- Environmental Protection (ENVP) (p. 17)
- Environment, Soil and Water Science (ESWS) (p. 17)
- Food Science and Technology (FDST) (p. 18)
- Forestry and Natural Resource Sciences (FNRS) (p. 19)
- Genetics (GEN) (p. 20)
- Human Nutrition and Foods (HN&F) (p. 21)
- Horticulture (HORT) (p. 23)
- Landscape Architecture (LARC) (p. 23)
- Plant Science (PLSC) (p. 24)
- Plant Pathology (PPTH) (p. 25)
- Resource Management (RESM) (p. 26)
- Veterinary Science (VETS) (p. 27)
- Wood Science (WDSC) (p. 29)
- Wildlife and Fisheries Management (WMAN) (p. 27)

## Animal and Veterinary Science (A&VS)

**A&VS 591. Advanced Topics. 1-6 Hours.**

PR:Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**A&VS 592. Directed Study. 1-6 Hours.**

Directed Study, reading, and/or research.

**A&VS 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**A&VS 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**A&VS 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**A&VS 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agriculture, forestry, and consumer science. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**A&VS 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**A&VS 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**A&VS 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**A&VS 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**A&VS 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**A&VS 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**A&VS 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**A&VS 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

**A&VS 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

**A&VS 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**A&VS 792. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**A&VS 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**A&VS 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**A&VS 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**A&VS 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or dissertation. (Grading may be S/U.).

## Applied and Environmental Microbiology (AEM)

### **AEM 545. Food Microbiology. 3 Hours.**

PR: AEM 341. The relationships of micro-organisms to food-borne illness and intoxications, microbial food quality, food spoilage, food preservation and bio-processing. The emerging food preservation technologies and predictive microbiology will be introduced.

### **AEM 549. Food Microbiology Lab. 1 Hour.**

PR: AEM 545. Laboratory training in methods used in microbiological examination of foods. This laboratory will provide hands-on experience for students who take or have taken AEM 545.

### **AEM 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

### **AEM 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

### **AEM 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

### **AEM 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

### **AEM 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

### **AEM 748. Sanitary Microbiology. 3 Hours.**

PR: AEM 341 or Consent. Microbiology and health hazards associated with food handling, water treatment, and sanitary waste disposal.

### **AEM 750. Current Concepts in Microbial Ecology. 1 Hour.**

Emphasis on reading, criticism, and discussion of recent journal articles from the primary literature in microbial ecology/environmental microbiology.

### **AEM 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of applied and environmental microbiology. NOTE: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

### **AEM 792. Directed Study. 1-6 Hours.**

Directed study, reading and/or research.

### **AEM 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

### **AEM 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## Agriculture, Forestry, and Consumer Sciences (AFCS)

### **AFCS 590. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agriculture, forestry and consumer sciences. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

### **AFCS 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

### **AFCS 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

### **AFCS 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

### **AFCS 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

### **AFCS 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

### **AFCS 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agriculture, forestry and consumer sciences. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**AFCS 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**AFCS 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**AFCS 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**AFCS 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**AFCS 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**AFCS 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**AFCS 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**AFCS 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertation (798). Grading is normal.

**AFCS 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

**AFCS 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agriculture, forestry and consumer sciences. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**AFCS 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**AFCS 792. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**AFCS 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**AFCS 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**AFCS 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**AFCS 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## **Agricultural Biochemistry (AGBI)**

**AGBI 512. Nutritional Biochemistry. 3 Hours.**

PR: AGBI 410 or Consent. Nutritional biochemistry of domestic animals.

**AGBI 512L. Nutritional Biochemistry Laboratory. 1 Hour.**

PR: AGBI 410 and AGBI 410L and PR or CONC: AGBI 512. Experiments to determine the nutritional constituents in animal and plant tissues.

**AGBI 514. Animal Biotechnology. 4 Hours.**

PR: Corequisite of AGBI 514L. The course will introduce students to the concepts and techniques of molecular biology and the application of these technologies in animal research. It will give the students laboratory experience in many molecular biology techniques.

**AGBI 514L. Animal Biotechnology Laboratory. 0 Hours.**

PR: Corequisite of AGBI 514. Animal Biotechnology - AGBI 514 Laboratory.

**AGBI 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

**AGBI 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**AGBI 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**AGBI 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**AGBI 595. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**AGBI 610. General Biochemistry. 4 Hours.**

PR: 8 hours of Organic Chemistry. The first half of a general course of biochemistry designed for graduate students of biological sciences. The course emphasizes the chemical properties of cellular constituents.

**AGBI 612. General Biochemistry. 4 Hours.**

PR: AGBI 610 or Consent. The second half of a general course of biochemistry designed for graduate students of biological sciences. The course emphasizes reactions and control of intermediary metabolism.

**AGBI 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agricultural biochemistry. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**AGBI 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**AGBI 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**AGBI 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**AGBI 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**AGBI 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**AGBI 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**AGBI 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**AGBI 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

**AGBI 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

**AGBI 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

**AGBI 792. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**AGBI 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**AGBI 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**AGBI 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**AGBI 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis (697), problem report (697), research paper or equivalent scholarly project (697), or a dissertation (797). (Grading may be S/U.).

**Agriculture and Extension Education (AGEE)****AGEE 520. Laboratory Teaching Methods. 2 Hours.**

Organization and preparation of teaching materials for middle and high school agriculture laboratory courses.

**AGEE 521. Laboratory Teaching Methods Practicum. 1 Hour.**

PR: AGEE 520. Organization and preparation of teaching materials for middle and high school agriculture laboratory courses.

**AGEE 526. Leadership Development FFA/SAE. 2 Hours.**

This course will focus on planning, advising, supervising and evaluating student educational experiences through youth organizations (FFA) and experiential learning programs (supervised agricultural experience).

**AGEE 527. Leadership Development FFA/SAE Practicum. 1 Hour.**

PR: AGEE 526. This course will focus on student demonstrations of planning, advising, supervising and evaluating student educational experiences through youth organizations (FFA) and experiential learning programs (supervised agricultural experience).

**AGEE 530. Teaching Agriculture. 2 Hours.**

Organization and preparation of teaching materials for middle and high school agriculture courses.

**AGEE 531. Teaching Agriculture - Practicum. 1 Hour.**

PR: AGEE 530. Practicum for the organization and preparation of teaching materials for middle and high school agriculture courses.

**AGEE 534. Effective Learning Environments. 2 Hours.**

Principles/processes in organizing and managing a positive and effective secondary agricultural education learning environment.

**AGEE 535. Effective Learning Environments - Practicum. 1 Hour.**

PR: AGEE 534. Practicum for demonstrating principles/processes in organizing and managing a positive and effective secondary agricultural education learning environment.

**AGEE 538. Program Planning in HS AG Education. 2 Hours.**

Development, organization, preparation and evaluation of materials/curriculum for teaching agriculture in middle and secondary schools.

**AGEE 570. History and Philosophy of Land Grant Education. 3 Hours.**

Students will complete an in-depth exploration of the purpose, history, and philosophies underlying modern land grant universities. Students will discuss the three pillars of land grants, and will assess their own roles as teachers, researchers, and community servants.

**AGEE 580. Change Theory in Agriculture. 3 Hours.**

This course will introduce students to principles of change theory, specifically examining Rogers' Diffusion of Innovations theory.

**AGEE 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

**AGEE 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**AGEE 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**AGEE 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**AGEE 595. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**AGEE 631. Planning Agricultural Programs and Courses. 3 Hours.**

PR: AGEE 430 or Consent. Formulating programs and courses for schools and communities.

**AGEE 642. Agriculture Education Research Methods and Design. 3 Hours.**

Explores definition of the problem, identification of related literature, selection of an appropriate research design, interpretation of results from data analysis procedures, and the reporting of research findings with emphasis on agricultural education.

**AGEE 644. Data Analysis/Interpretation. 3 Hours.**

Explores the selection of appropriate statistical methods, use of statistical software packages to analyze data, interpretation of results from data analysis procedures, and the report of research findings with emphasis on agricultural education.



**AGEE 646. Instrumentation and Survey Research Methods Design. 3 Hours.**

PR: AGEE 642. Principles, theories, techniques, and applications for developing survey questionnaires and conducting survey research in agriculture and social sciences; developing questions; constructing instruments; implementing surveys; reducing coverage and sampling errors. The purpose of survey research is to explore and/or describe a given population--typically from samples of the population.

**AGEE 650. Program Development in Community Education. 3 Hours.**

Planning, implementation and evaluation of programs in non-formal rural and community educational settings.

**AGEE 651. Program Evaluation in Comm Ed. 3 Hours.**

Evaluation principals, models, designs and procedures used in developing and analyzing agricultural and extension education programs. Evaluations role in needs assessments, implementation and marketing to stakeholders.

**AGEE 670. Thesis and Dissertation Proposal Development. 1 Hour.**

This course is designed to assist students in the preparation of their thesis or dissertation research proposal, specific to social science research. Students will submit an acceptable draft of the first three chapters of their thesis/dissertation proposal by the end of the course.

**AGEE 680. Advanced Principles of Teaching and Learning. 3 Hours.**

Theoretical exploration for those who will teach in formal learning environments, this course focuses on principles, theories, and philosophical issues common to educators in general. It will introduce learners to literature and research relevant to practicing educators. Delivered using a flipped classroom design, graduate students will engage in practical teaching to increase transfer and consumption.

**AGEE 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agricultural and environmental education. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**AGEE 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**AGEE 692. Directed Study. 1-6 Hours.**

Directed study, reading and/or research.

**AGEE 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**AGEE 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**AGEE 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**AGEE 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**AGEE 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**AGEE 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

**AGEE 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

**AGEE 900. Professional Development. 1-6 Hours.**

Professional development courses provide skill renewal or enhancement in a professional field or content area (e.g. education, community health, geology). The continuing education courses are graded on a pass/fail grading scale and do not apply as graduate credit toward a degree program.

**AGEE 930. Professional Development. 1-6 Hours.**

Professional development courses provide skill renewal or enhancement in a professional field or content area. (e.g. education, community health, geology). These tuition waived continuing education courses are graded on a pass/fail grading scale and do not apply as graduate credit toward a degree program.



## Agriculture(AGRL)

### **AGRL 590. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agriculture. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

### **AGRL 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

### **AGRL 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

### **AGRL 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

### **AGRL 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

### **AGRL 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

### **AGRL 660. Problem Report. 1-3 Hours.**

### **AGRL 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agriculture. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

### **AGRL 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

### **AGRL 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

### **AGRL 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

### **AGRL 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

### **AGRL 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

### **AGRL 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

### **AGRL 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

### **AGRL 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

### **AGRL 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

### **AGRL 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agriculture. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

### **AGRL 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

### **AGRL 792. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**AGRL 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**AGRL 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**AGRL 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**AGRL 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## **Agronomy (AGRN)**

**AGRN 502. Soil Science: Principles and Practices. 3 Hours.**

PR: Graduate standing, Cannot receive credit for AGRN 502 and AGRN 202 or the equivalent. An in-depth examination of the microscopic and macroscopic properties of soils and how these interact to produce a fragile, non-renewable natural body on the landscape. Discussion of soils as an ecological resource and learn how the physical, chemical, and biological properties of soils impact plant growth, land use and management, and environmental protection.

**AGRN 525. Forage Harvesting and Storage. 3 Hours.**

PR: AGRN 454 or Consent. Advanced study of processes associated with harvesting and storage of forages. (3 hr. lec.).

**AGRN 554. Pasture Management and Utilization. 3 Hours.**

PR: AGRN 454 and ANNU 260 or consent. Advanced study of pastures and their management and utilization with emphasis on temperate species. (3 hr. lec.).

**AGRN 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**AGRN 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**AGRN 593. Special Topics. 1-6 Hours.**

**AGRN 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**AGRN 595. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**AGRN 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

**AGRN 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**AGRN 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**AGRN 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**AGRN 695. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**AGRN 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**AGRN 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**AGRN 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision is needed during the writing of student reports (698). theses (698), or dissertations (798). (Grading is Normal.).

**AGRN 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium, to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is Normal; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

**AGRN 710. Soil Testing and Plant Analysis. 3 Hours.**

PR: AGRN 210 and BIOL 350, or Consent. Influence of soil chemical and physical properties on availability of plant nutrients; intensive study of individual plant nutrients and interactions of nutrients in soils and crops; and intensive study of methods used to test soils and analyze plants for nutrients and other metals. (2 hr. lec., 1 hr. lab.).

**AGRN 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agronomy. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**AGRN 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**AGRN 792. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**AGRN 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**AGRN 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**AGRN 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**AGRN 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## Animal Nutrition (ANNU)

**ANNU 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

**ANNU 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ANNU 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ANNU 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**ANNU 595. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**ANNU 601. Principles of Nutrition and Metabolism. 3 Hours.**

PR: AGBI 410 or consent. A basic course in principles of nutrition with emphasis on the major classes of dietary nutrients and their digestion and utilization.

**ANNU 602. Nutrition and Physiological Function. 3 Hours.**

PR: ANNU 601 or Consent. Sequence to ANNU 601. Techniques used in nutritional studies and the relationship of nutrient requirements to physiological function in species of laboratory and domestic animals and man.

**ANNU 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of animal nutrition. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**ANNU 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**ANNU 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ANNU 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ANNU 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**ANNU 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ANNU 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**ANNU 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**ANNU 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

**ANNU 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

## **Animal Physiology (ANPH)**

**ANPH 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

**ANPH 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ANPH 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ANPH 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**ANPH 595. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**ANPH 675. Reproduction Colloquium. 1 Hour.**

PR: Graduate standing. Weekly discussions by graduate students and faculty in reproductive physiology program of current literature in the field, particularly of mammalian species.

**ANPH 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**ANPH 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ANPH 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ANPH 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**ANPH 695. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**ANPH 696. Graduate Seminar. 1 Hour.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**ANPH 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**ANPH 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision is needed during the writing of student reports (698). theses (698), or dissertations (798). (Grading is Normal.).

**ANPH 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium, to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is Normal; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

**ANPH 726. Endocrinology of Reproduction. 4 Hours.**

(2 labs) PR: ANPH 424 or BIOL 413 or equivalent. Discussion of and laboratory experience in classical and current concepts of hormonal and neurohormonal regulations of reproductive phenomena with emphasis on species differences and similarities.

**ANPH 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of animal physiology. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**ANPH 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**ANPH 792. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ANPH 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ANPH 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ANPH 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**ANPH 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**Animal Production (ANPR)****ANPR 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

**ANPR 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ANPR 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ANPR 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**ANPR 595. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**ANPR 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of animal production. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**ANPR 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**ANPR 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ANPR 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ANPR 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**ANPR 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ANPR 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**ANPR 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**ANPR 698. Thesis or Dissertation. 1-6 Hours.**

ANPR 698. Thesis or Dissertation. 1-6Hr. PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

**ANPR 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

## **Agriculture Natural Resources and Design (ANRD)**

**ANRD 593. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**ANRD 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ANRD 690. Teaching Practicum. 1-3 Hours.**

ANRD 690. Teaching Practicum. 1-3 hr. PR: Consent. Supervised practice in college teaching of agriculture, natural resources, and design. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**ANRD 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ANRD 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## **Agriculture and Resource Economics (ARE)**

**ARE 540. Rural and Regional Development. 3 Hours.**

PR: ARE 300 and ARE 321. Economic theories and quantitative techniques. Problems and goals for rural and regional planning; methods of policy analysis for community infrastructure development.

**ARE 542. International Agricultural Economic Development. 3 Hours.**

Current problems, theories, policies, and strategies in planning for agricultural and rural development for increased food production and to improve the well-being of rural people in the developing countries of the world.

**ARE 580. Energy Industry Economics. 3 Hours.**

PR: Graduate standing. Technical production and consumption methodologies, environmental concerns, and national and global economics and politics in making energy decisions.

**ARE 581. Resource Appraisal and Decision Making. 3 Hours.**

PR: ARE 500 or equivalent. Investment analysis, decision making under risk and uncertainty, and project analysis applied to resource exploration and utilization; mineral and energy reserve and resource estimation techniques.

**ARE 585. Economics of Water Resources and Energy. 3 Hours.**

PR: Calculus with a grade of B- or better or consent, introductory micro economics with a C- or better or consent. Allocation under scarcity, water institutions and management, risk, pricing, marketing, demand and supply estimation, interdependence between energy and water resources (Credit can not be received for both ARE 485 and ARE 585).

**ARE 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

**ARE 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ARE 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.



**ARE 594. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**ARE 595. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**ARE 600. Research Methods. 1 Hour.**

Research methods in agricultural, environmental, and resource economics. The application of scientific thinking in developing research proposals and critiquing published research.

**ARE 601. Applied Microeconomics. 4 Hours.**

PR: ARE 401 or equiv. Consumer and production economics applied to resource, environmental, and agricultural analysis.

**ARE 620. Adaptation and Mitigation Strategies for Addressing Climate Change. 3 Hours.**

This course identifies mechanisms that may be used to offset or reduce the effects of a changing climate. It addresses options that can help to protect agriculture and food production, protect human health, improve water resources and ecosystems services, and provide for the energy needed for continued economic activity. Students cannot receive credit for both ARE 420 and ARE 620.

**ARE 621. Quantitative Methods in Resource Economics. 3 Hours.**

PR: ARE 601 and ECON 421 or equivalents. Optimization techniques in economic analysis of natural resources; environmental and agricultural management problems; linear, nonlinear, and dynamic programming.

**ARE 624. Econometric Methods in Resource Economics. 3 Hours.**

PR: ECON 425. Application methods to natural resource, environmental, and agricultural economic problems; single and simultaneous equation models, specification problems, topics in time series, and cross-sectional analysis.

**ARE 632. Natural Resource and Environmental Economics. 3 Hours.**

PR: ARE 600 and ARE 621 or equivalent. Theory and institutions; market failure, externalities and property rights issues; renewable and nonrenewable resources, common property, environmental and resource management, and intergenerational decisions.

**ARE 633. Natural Resource Policy Analysis. 3 Hours.**

PR: ARE 600 and ARE 621, or equiv. Welfare economics applied to the analysis and evaluation of natural resources, environmental, agricultural, and energy policy issues.

**ARE 643. Project Analysis and Evaluation. 4 Hours.**

Analysis and evaluation of investment projects; economic and financial aspects of project analysis; risk analysis; preparation of feasibility reports.

**ARE 644. International Markets and Trade. 3 Hours.**

PR: ARE 600 and ARE 621. Causes and consequences of international trade and investment; commodity market structures, commodity price instability and international agreements; trade barriers and protection, export promotion, and impacts on developing countries.

**ARE 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of agriculture research economics. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**ARE 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**ARE 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ARE 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ARE 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**ARE 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ARE 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**ARE 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**ARE 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.



**ARE 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is P/F; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

**ARE 703. Advanced Natural Resource Economic Theory. 3 Hours.**

PR: ECON 710 and ARE 632. Allocation and distribution of natural resources in static and dynamic contexts; welfare economics, cost-benefit analysis, and optimal control approaches; applications to resource valuation, exhaustion, taxation, and regulation in theory and practice.

**ARE 710. Advanced Environmental Economics. 3 Hours.**

PR: ECON 701 and ARE 632 or Consent. Theory, efficient environmental design and analysis, modeling of economic and environmental systems, evaluation of non-market benefits and costs, and risk assessment.

**ARE 729. Spatial Econometrics. 3 Hours.**

Explores the various types of spatial econometric models and how they are estimated and interpreted. Maximum likelihood and Bayesian methodologies will be demonstrated both mathematically and in an applied setting.

**ARE 730. Advanced Applied Econometrics. 3 Hours.**

PR: ECON 701 and ECON 711 and ECON 721 and ECON 725 and ECON 726. Expands upon economic and econometric theory to develop further the research expertise in applied econometrics. This includes critical analysis of when certain methods are applicable given the research question or data available.

**ARE 735. Resources of Development Planning. 3 Hours.**

**ARE 790. Teaching Practicum. 1-3 Hours.**

Supervised practice in college teaching of agriculture. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**ARE 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

**ARE 792. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ARE 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ARE 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ARE 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate students will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**ARE 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis (697), problem report (697), research paper or equivalent scholarly project (697), or a dissertation (797). Grading may be S/U.

## Energy Land Management (ENLM)

**ENLM 500. Advanced Negotiations and Ethics for Energy Land Managers. 3 Hours.**

Formation and delivery of detailed negotiation scenarios commonly encountered in energy projects. Focuses on negotiating positions, techniques, and styles in accordance with professional ethics and standards of practice.

**ENLM 510. Water & Energy Systems. 3 Hours.**

This course will cover the practice, use, and issues with water in energy systems ranging from the history of water usage to the current practices and the developing technologies for water treatment and use.

**ENLM 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

## Entomology (ENTO)

**ENTO 503. Medical Entomology. 3 Hours.**

Medically important arthropods affecting health of humans and domestic animals. Epidemiology of major arthropod-transmitted diseases of humans and animals. Identification, rearing, collecting, preparation and control of medically important arthropods.

**ENTO 590. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of entomology. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**ENTO 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**ENTO 595. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**ENTO 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ENTO 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**ENTO 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of Entomology. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**ENTO 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**ENTO 792. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**ENTO 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ENTO 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ENTO 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**ENTO 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## Environmental Protection (ENVP)

**ENVP 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ENVP 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**ENVP 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper, or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## Environment, Soil and Water Science (ESWS)

**ESWS 515. Hazardous Waste Training. 3 Hours.**

PR: Corequisite of ESWS 515L. A course covering important aspects of hazardous waste training. Includes health and safety plan development, protective equipment, air monitoring, incident command, site characterization, toxicology, full scale disaster exercises, risk assessment and safety plan writing.

**ESWS 515L. Hazardous Waste Training Laboratory. 0 Hours.**

PR: Corequisite of ESWS 515. Hazardous Waste Training - ESWS 515 Laboratory.

**ESWS 516. Soil Chemistry. 3 Hours.**

PR: ESWS 410. An analysis of the important reactions that occur in soils; thermodynamic and kinetic aspects of these reactions and application to modern problems in soil chemistry.

**ESWS 525. Principles of Water Resources. 3 Hours.**

Geographic distribution/redistribution, quantity, and quality of water resources and their roles in human and environmental systems. Applies alternative policy frameworks to explore the decision-making challenges surrounding water resources.

**ESWS 552. Pedology. 3 Hours.**

PR: ESWS 417 or consent. Genesis and evolution of soils considered as natural bodies; including both macro-and micromorphological properties. Week-long field trip required at student's expense.

**ESWS 555. Environmental Sampling and Analysis. 3 Hours.**

PR: ESWS 155 or consent. Introduction to environmental sampling and analysis. Lecture and hands-on experience will include sampling plan development, sampling point selection, sampling equipment use, containers, preservatives sample analysis, chain-of-custody, protective equipment and technical report development.

**ESWS 575. Environmental Water Resources. 3 Hours.**

This course provides background in the fundamentals of environmental water resources and will equip students with requisite knowledge to address complex contemporary water resources issues via focused curricula including (but not limited to): land use practices, water use, and the physical principles of precipitation, infiltration, evapotranspiration, overland and subsurface flow, stream flow, and water use management practices.

**ESWS 590. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching.

**ESWS 593. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**ESWS 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ESWS 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching.

**ESWS 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ESWS 695. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**ESWS 696. Graduate Seminar. 1-3 Hours.**

PR Consent. Series of meetings that may include research presentations by students, faculty, or visitors; discussions of professional issues or current literature; or other varying topics.

**ESWS 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project or a dissertation. (Grading may be S/U.).

**ESWS 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching.

**ESWS 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**ESWS 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ESWS 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**ESWS 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## **Food Science and Technology (FDST)**

**FDST 545. Food Microbiology. 3 Hours.**

PR: ENVM 341. The relationships of microorganisms to food-borne illness and intoxications, microbial food safety and food quality, food spoilage, food preservation and bio-processing. The emerging food preservation technologies and predictive microbiology will be introduced.

**FDST 545L. Food Microbiology Laboratory. 1 Hour.**

PR or CONC: FDST 545. Laboratory training in methods used in microbiological examination of foods. This laboratory will provide hands-on experience for students who take or have taken FDST 545.

**FDST 593. Special Topics. 1-6 Hours.**

Study of advanced topics that are not covered in regularly scheduled courses.

**FDST 595. Independent Study. 1-9 Hours.****FDST 670. Advanced Muscle Foods. 3 Hours.**

PR: FDST 365 and FDST 367. Theoretical and experimental aspects of muscle food science, muscle food production/process systems, and the quantitative biology of muscle systems used for food.

## Forestry and Natural Resource Sciences (FNRS)

**FNRS 512. Silvicultural Practices for Hardwood Forest Types. 3 Hours.**

PR: (FMAN 311 or (FNRS 311 and FNRS 311L). Designing proper silvicultural systems for managing Appalachian hardwood stands; reconstructing stand histories, recognizing problems, and prescribing appropriate silvicultural treatment.

**FNRS 523. Sustainable Urban Forests. 3 Hours.**

This course equips you with the knowledge and tools to manage urban trees as part of a sustainable environment. Through in-class discussions, we explore how urban forests contribute to local communities, offering sociological, environmental, economic, and aesthetic benefits.

**FNRS 525. Vegetation of West Virginia. 3 Hours.**

PR: (FNRS 205 and FNRS 205L) or FOR 205). Basics of plant taxonomy and community ecology, use of technical field keys, study of selected plant families, field trips to unusual and/or important plant communities and forest types in West Virginia.

**FNRS 535. Fire Ecology. 3 Hours.**

Effects of wildfire on various aspects of ecosystems. Topics include fire history and historic fire regimes; the physical processes of combustion, heat transfer and fire behavior; interactions with soil, water, vegetation, and climate; and how fire affects cultural resources and the economy.

**FNRS 540. Advanced Physical Behavior of Wood. 3 Hours.**

PR: WDSC 340 or equivalent or consent. Physical relationships of water and wood; fluid flow through wood; thermal, electrical, and acoustical behavior of wood. Theories of wood drying and their application.

**FNRS 542. Current Issues in Forest Management. 3 Hours.**

PR: Consent. Analysis of environmental issues in forest management and current controversies surrounding the management of forested lands. Emphasis on traditional and ecosystem-based forest management policy, philosophy, and practices.

**FNRS 555. Computer Applications in Forest Resource Management. 3 Hours.**

PR: Corequisite of FNRS 555L. Computer programming/system modeling in forest resource management. Emphasis on basic programming/modeling skills and application examples in forest operations, management, and engineering.

**FNRS 555L. Computer Applications in Forest Resource Management Laboratory. 0 Hours.**

PR: Corequisite of FNRS 555. Computer Applications in Forest Resource Management - FNRS 555 Laboratory.

**FNRS 560. Tree Ecophysiology. 3 Hours.**

The basic processes necessary for trees to survive, grow, and reproduce (e.g., carbon metabolism, water and nutrient uptake) with an emphasis on the impacts of abiotic stresses (drought, flood, elevated carbon dioxide, low light, nutrient depletion, low soil aeration) on these plant functions.

**FNRS 575. Forest Soils: Ecology and Management. 3 Hours.**

PR: AGRN 410 or AGRN 425 or consent. Properties, nutrient cycling processes, and sustainable management of forest soils, with examples from the most important wood fiber producing regions of the U.S.: the southeast, Pacific Northwest, and the central hardwood forest.

**FNRS 585. Environmental Water Resources. 3 Hours.**

This course provides background in the fundamentals of environmental water resources and will equip students with requisite knowledge to address complex contemporary water resources issues via focused curricula including (but not limited to): land use practices, water use, and the physical principles of precipitation, infiltration, evapotranspiration, overland and subsurface flow, stream flow, and water use management practices.

**FNRS 590. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of forestry. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**FNRS 593. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**FNRS 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**FNRS 611. Advanced Forest Ecology. 3 Hours.**

PR: (FMAN 212 or (FNRS 212 and FNRS 212L) or equivalent) and (FMAN 311 or (FNRS 311 and FNRS 311L). Ecological relationships in forests with emphasis on biogeochemical cycles.

**FNRS 623. Anatomy of North American Wood. 3 Hours.**

Anatomy and identification of commercially important North American woods. For students who have not completed a course in the anatomy of American woods.

**FNRS 630. Forest Valuation and Investment. 3 Hours.**

Asset valuation concepts, with special emphasis on forests. Financial analyses of forest operations. Concepts and strategies in forestland investment and portfolio management.

**FNRS 631. Forest Stand Dynamics. 3 Hours.**

PR: Undergraduate courses in ecology or silviculture, and statistics. Examination of the processes causing temporal and spatial changes in communities of trees including: stand establishment, growth, competition, disturbance and mortality. Labs focus on the quantification of stand development patterns.

**FNRS 640. Advanced Forest Biometrics. 3 Hours.**

PR: (FMAN 222 or (FNRS 222 and FNRS 222L) and STAT 511. Review and application of mathematical and statistical models used in forest volume, taper and height estimation procedures.

**FNRS 641. Forest Growth and Yield Modeling. 3 Hours.**

PR: FMAN 640 or FNRS 640. Review and application of mathematical and statistical models used in forest growth and yield modeling.

**FNRS 644. Forest Growth and Yield Modeling. 3 Hours.**

PR: FMAN 640 or FNRS 640. Review and application of mathematical and statistical models used in forest growth and yield modeling.

**FNRS 645. Advanced Bio-Based Energy Systems. 3 Hours.**

Introduction to biomass feedstock production for bioenergy applications, preprocessing and characterization, biofuel conversion technologies, economic and environmental impacts, and green house gas emissions.

**FNRS 650. Economics, Environment and Education in West Virginia. 3 Hours.**

This course is designed for K-12 classroom teachers with little previous background in economics. We introduce the principles of economics using the WV forest products industry to provide examples.

**FNRS 655. Watershed Hydrology. 3 Hours.**

PR: Prior course work/experience in hydrology, water, earth and atmospheric sciences or permission by the instructor. A qualitative and quantitative understanding of principles governing the occurrence, distribution, and circulation of water near the Earth's surface. Emphasis is on the physical understanding and parameterization of hydrologic processes and the water cycle.

**FNRS 670. Human Dimensions of Natural Resource Management. 3 Hours.**

PR: Graduate standing. This course applies social science theory and methods to solving natural resource management problems.

**FNRS 693. Special Topics. 1-6 Hours.**

Study of contemporary topics selected from recent developments in the field.

**FNRS 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**FNRS 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading will be S/U.).

**FNRS 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

**FNRS 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

**FNRS 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**FNRS 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## Genetics (GEN)

**GEN 521. Basic Concepts of Modern Genetics. 3 Hours.**

PR: 8 hours of biological sciences and one year of chemistry courses. Independent inheritance. Chemical nature of genetic material. Control of phenotype by genetic material. Gene action and coding of genetic material.

**GEN 525. Human Genetics. 3 Hours.**

PR: GEN 371 or GEN 521 or Consent. Study of genetic system responsible for development of phenotype in man.

**GEN 535. Population Genetics. 3 Hours.**

PR: GEN 371 or GEN 521 or Consent. Relationship of gene and genotype frequencies in populations of diploid organisms, and the effects of mutation, selection, assortive mating, and inbreeding in relation to single gene pairs. Application of these concepts to multigenetic inheritance of quantitative traits.

**GEN 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**GEN 592. Directed Study. 1-6 Hours.**

Directed study, reading and/or research.

**GEN 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**GEN 630. Conservation Genetics. 3 Hours.**

Study of population genetic concepts relevant to small populations, with a focus on management implications of genetic data and current applications of conservation genetics. Cross-listed with WMAN 630.

**GEN 692. Directed Study. 1-6 Hours.**

Directed study, reading and/or research.

**GEN 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**GEN 724. Cytogenetics. 4 Hours.**

PR: GEN 171 or GEN 321. Emphasis on macromolecules that carry information of the chromosomes, cell division, and the cytological and molecular basis of genetics. Special attention given to visible manifestation of genes, human cytogenetics of genomes and chromosome morphology, and their evolution.

**GEN 726. Advanced Biochemical Genetics. 3 Hours.**

PR: GEN 371 or GEN 521 and organic chemistry. Physiological and biophysical concepts of genetic material. Structure and arrangement of genetic units. Nucleic acids as carriers of genetic information. Gene action and amino acid coding. Biochemical evolution of genetic material. Genetic control mechanisms of mutation.

**GEN 727. Genetic Mechanisms of Evolution. 3 Hours.**

PR: GEN 371 or equivalent. Molecular genetic mechanisms which result in evolutionary change. Origin of life, origin and organization of genetic variability, differentiation of populations, isolation and speciation, role of hybridization and polyploidy, and origin of man.

**GEN 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of Genetics. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**GEN 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**GEN 792. Directed Study. 1-6 Hours.**

Directed study, reading and/or research.

**GEN 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**GEN 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**GEN 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**GEN 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## Human Nutrition and Foods (HN&F)

**HN&F 505. Dietetic Supervised Practice 1. 1-3 Hours.**

PR: Instructor approval and acceptance into the Dietetic Internship is required. This course provides an introduction to supervised practice recognized by the Accreditation Council on Education for Nutrition & Dietetics (ACEND) at WVU. Practicum preceptors, sites and intern obligations will be reviewed. Interns will be required to develop social media portfolio to document their supervised practice experience.



**HN&F 510. Advanced Medical Nutrition Therapy. 3 Hours.**

PR: HN&F 473 and HN&F 474 or equivalent background in a medically-related field. Designed to provide students with the opportunity integrate the theories and principles of medical nutrition therapy into clinical practice. The etiology and pathophysiology of nutrient related-diseases and the role of medical nutrition therapy is critically evaluated. Case studies are used to practice critical thinking to effectively plan and manage the nutritional care of patients, with a variety of disease states.

**HN&F 512. Maternal and Child Nutrition. 3 Hours.**

PR: Consent. Physiological changes and nutritional requirements during pregnancy and lactation. Effects of growth and development on nutritional requirements during infancy, childhood and adolescence.

**HN&F 548. Science of Food Preparation. 3 Hours.**

PR: Corequisite of HN&F 548L. This graduate level course aims to develop in students an appreciation of food systems as complex biological and chemical materials by integrating biochemical principles into scientific theories and concepts related to food preparation. This course will challenge their understanding of ingredients and cooking methods and how these impact the nutritional and sensory properties of food.

**HN&F 548L. Science of Food Preparation Laboratory. 0 Hours.**

PR: Corequisite of HN&F 548. This graduate level course aims to develop in students an appreciation of food systems as complex biological and chemical materials by integrating biochemical principles into scientific theories and concepts related to food preparation. This course will challenge their understanding of ingredients and cooking methods and how these impact the nutritional and sensory properties of food.

**HN&F 590. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of human nutrition and foods. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**HN&F 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**HN&F 592. Directed Study. 1-6 Hours.**

Directed study, reading and/or research.

**HN&F 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**HN&F 610. Nutrition and Fitness. 3 Hours.**

PR: HN&F 171 or equivalent. Upon completion of this course the student will understand the physiological and metabolic changes that occur during physical activity and the ways in which those changes alter nutritional requirements.

**HN&F 614. Nutrition/Disease Prevention. 3 Hours.**

This graduate level course covers the role of nutrition in the pathophysiology of chronic diseases, critical analysis, and translation of research into dietary recommendations for the prevention/treatment of chronic diseases.

**HN&F 670. Human Nutrition Concepts and Application. 3 Hours.**

PR: HN&F 460 or equivalent, and consent. Critical study of the nutrient evaluation methods and the nutrient requirements of the human in health and disease, and scope of its application.

**HN&F 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**HN&F 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**HN&F 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**HN&F 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**HN&F 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**HN&F 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**HN&F 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use the University's facilities, and participate in its academic and cultural programs. NOTE: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium, to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is P/F; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.



**HN&F 900. Professional Development. 1-6 Hours.**

Professional development courses provide skill renewal or enhancement in a professional field or content area (e.g. education, community health, geology). These continuing education courses are graded on a pass/fail grading scale and do not apply as graduate credit toward a degree program.

**HN&F 930. Professional Development. 1-6 Hours.**

Professional development courses provide skill renewal or enhancement in a professional field or content area (e.g. education, community health, geology). These tuition-waived continuing education courses are graded on a pass/fail grading scale and do not apply as graduate credit toward a degree program.

## Horticulture (HORT)

**HORT 590. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of Horticulture. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**HORT 692. Directed Study. 1-6 Hours.****HORT 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**HORT 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**HORT 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**HORT 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## Landscape Architecture (LARC)

**LARC 520S. Introduction to Design Studio. 4 Hours.**

Theory, principles, and elements of site planning and design. Lectures, readings, short problems, and site visits dealing with site analysis, ecological considerations, circulation and parking, management, and cost factors. Also includes basic computer graphics.

**LARC 532. Recreation, Trails, and Community Development. 3 Hours.**

Using outdoor recreation as a facilitator of community development, this course will provide a preview of comprehensive trail planning strategies guiding sustainable trail development, including the benefits of trails (economic, health, and social), strategies for stakeholder engagement, funding, activation and programming, and evaluation. Online, 3-credit graduate course, cross listed with LARC 332 (for undergraduate students).

**LARC 534. Sustainable Trails: Design Concepts. 3 Hours.**

Plan trail networks according to current best practices, responding to site topography and aesthetics while incorporating skills progression and accessibility for trail users of all skill levels. Online, 3-credit graduate course, cross listed with LARC 334 (for undergraduate students).

**LARC 535. Sustainable Trails: Design Detailing & Drainage. 3 Hours.**

PR: LARC 534. Refine trail masterplans for costing, bidding and construction documentation with site-specific detailing and specifications, while incorporating stormwater management best practices and ecological restoration principles. Online, 3-credit graduate course, cross listed with LARC 335 (for undergraduate students).

**LARC 537. Sustainable Trails: Practicum Experience. 1-3 Hours.**

PR or CONC: LARC 535 and RPTR 536. Engage directly in a trail project's design, construction, maintenance and/or monitoring, through a service-learning capstone project in sustainable trails development. Work with stakeholders and community representatives directly to support recreation economy development. Can be repeated for credit: students can enroll for 1, 2, or 3 credits at once. Online, graduate course, cross listed with LARC 437 (for undergraduate students).

**LARC 550. Design Studio. 1 Hour.**

PR: LARC 520 and PR or CONC: LARC 550S. Medium scale site design and development including planting, design and grading. Application of basic design principles, programming, and site analysis reinforcing design processes and visual thinking in the design of sites.

**LARC 550S. Design Studio. 3 Hours.**

PR or CONC: LARC 550. Design Studio.

**LARC 570. Meanings of Place. 3 Hours.**

PR: Consent Study of place as a psychological and social phenomenon with implications for community development, historic preservation, interpretation, design, management, natural and cultural sustainability, and human well-being. (equivalent to RPTR 570).

**LARC 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**LARC 650. Land and Environment Planning and Design. 1 Hour.**

PR: LARC 550 with a minimum grade of B- and PR or CONC: LARC 650S. Introduction to and understanding of environmental planning, design and management of natural and social landscape systems at a regional, watershed, or ecosystem scale. Studies focus on systems inventory, analysis and impact assessment. GIS and 3D modeling applications will be integrated into this course.

**LARC 650S. Land and Environment Planning and Design Studio. 4 Hours.**

PR or CONC: LARC 650. Land and Environment Planning and Design Studio.

**LARC 651. Community Planning and Design. 1 Hour.**

PR: LARC 650 and PR or CONC: LARC 651S. Design studies focused on community planning, community development, and community growth. Integration with a community design team or other outreach project.

**LARC 651S. Community Planning and Design Studio. 4 Hours.**

PR or CONC: LARC 651. Community Planning and Design Studio.

**LARC 652. Land Development Princ. 1 Hour.**

PR: LARC 650 and LARC 651 and PR or CONC: LARC 652S. Brief history of land development. Design studio involving large scale design; projects with extensive time implementation sequence.

**LARC 652S. Land Development Principles/Practice Studio. 4 Hours.**

PR or CONC: LARC 652. Land Development Principles/Practice Studio.

**LARC 664. Designing Healthy Places. 3 Hours.**

Examination and analysis of environmental design solutions that have positive impacts for individual and community health outcomes.

**LARC 670. Research Methods in Design. 2 Hours.**

A survey of the philosophies and methodologies of science and research as they apply to the field of landscape architecture. Development of research methods for terminal project.

**LARC 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**LARC 694. Seminar. 1-6 Hours.**

Seminars arranged for advanced graduate students.

**LARC 695. Independent Study. 1-9 Hours.**

Faculty-supervised study of topics not available through regular course offerings.

**LARC 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**LARC 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis (697), problem report (697), research paper or equivalent scholarly project (697), or a dissertation (797). (Grading may be S/U).

**LARC 698. Thesis. 1-6 Hours.**

This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

## Plant Science (PLSC)

**PLSC 547. Applied Wetlands Ecology and Management. 3 Hours.**

The management and ecology of wetland vegetation, soils, hydrology, and wildlife. (Cross listed as WMAN 547 and CE 547.).

**PLSC 550. Grants and Grantsmanship. 2 Hours.**

A course covering all steps of grant preparation, application, submission and review process.

**PLSC 553. Organic Crop Production. 3 Hours.**

PR: PLSC 206 and AGRN 202 and AGRN 203 or consent. Principles, practices, history, philosophy and economics of organic farming and gardening. Crop/livestock systems, national and international research on organic production. (Students may not receive credit for both PLSC 453 and PLSC 553).

**PLSC 560. Plant Biochemistry. 3 Hours.**

PR: (CHEM 231 or (CHEM 233 and CHEM 234)) and BIOL 219 or consent. Study of the biochemical processes and biosynthetic pathways leading to the formation of desirable plant products such as those used in food, feed, fiber, fuel and medicinal applications. (Credit cannot be received for both PLSC 460 and PLSC 560).

**PLSC 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**PLSC 592. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**PLSC 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**PLSC 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**PLSC 692. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**PLSC 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**PLSC 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading will be S/U.).

**PLSC 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in college teaching of plant science. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**PLSC 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**PLSC 792. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**PLSC 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**PLSC 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**PLSC 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**PLSC 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## Plant Pathology (PPTH)

**PPTH 501. Diseases of Economic Plants. 3 Hours.**

; 2 Hr. in summer. PR: PPT 401 or 503 or consent. Recognition, cause, and control of diseases of economic plants. (Sem. 1--Diseases of vegetable crops and of tree and small fruits; Sem. 2--Diseases of ornamental plants and field and forage crops; S--Diseases of forest trees. Students may register for 1-3 Hrs. in fall and spring and 2 Hr. in summer until 8 hours of credit are accumulated).

**PPTH 503. Mycology. 4 Hours.**

PR: Corequisite of PPTH 503L. Lectures and field and laboratory studies of parasitic and saprophytic fungi.

**PPTH 503L. Mycology Laboratory. 0 Hours.**

PR: Corequisite of PPTH 503. Mycology - PPTH 503 Laboratory.

**PPTH 509. Nematology. 3 Hours.**

PR: Corequisite of PPTH 509L. (Primarily for graduate students majoring in the agricultural sciences or biology.) Nematode taxonomy, binomics, and control, with particular emphasis on plant parasitic forms.

**PPTH 509L. Nematology Laboratory. 0 Hours.**

Coreq: PPTH 509. Nematology - PPTH 509 Laboratory.

**PPTH 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**PPTH 593. Special Topics. 1-6 Hours.****PPTH 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**PPTH 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**PPTH 730. Physiology of the Fungi. 4 Hours.**

PR: Organic chemistry, mycology, and bacteriology, or Consent. Physiological aspects of growth, reproduction, and parasitism of fungi, with emphasis on nutrition, environmental, and other biotic factors.

**PPTH 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in the college teaching of plant pathology. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**PPTH 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**PPTH 792. Directed Study. 1-6 Hours.**

Directed study, reading, and/or research.

**PPTH 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**PPTH 795. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**PPTH 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**PPTH 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## **Resource Management (RESM)**

**RESM 505L. Drones in Resource Management. 3 Hours.**

PR: An interest in aeronautical principals, spatial data collection and analysis, and natural resource applications is preferred. Provides training in the use of drones to collect and analyze spatial data in natural resource applications.

**RESM 540. Geospatial Modeling. 3 Hours.**

There are two goals for this course: to present the fundamental methods for analyzing spatial data statistically, and to demonstrate spatial model building implementation and analysis. A prior statistics or econometric course is recommended.

**RESM 545. Spatial Hydrology and Watershed Analysis. 3 Hours.**

PR: RESM 440 or consent. Introduction to applied spatial hydrology using GIS; integrates statistical modeling and terrain analysis; provides insights into water quality and quantity analysis for local and regional watershed scales. (Credit cannot be received for both RESM 445 and RESM 545.).

**RESM 560. Advanced Energy Project and Program Management. 3 Hours.**

This course builds around the concepts and best practices required to manage, coordinate and provide effective leadership for multi-dimensional programs and projects in the energy and environmental resource industries.

**RESM 575. Spatial Analysis for Resource Management. 3 Hours.**

This interdisciplinary course develops and applies advanced Geography Information System (GIS) and spatial analysis skills for natural resource and environmental management. (Previous GIS experience helpful.).

**RESM 585. GIS and Spatial Analysis Project. 3 Hours.**

PR: RESM 440 or GEOG 350 or consent. Provides an opportunity for students to pursue a research interest in the spatial sciences with development of an applied spatial project and paper. Guidance and direction will be provided to assure relevant integration of the geospatial techniques to address the problem addressed.

**RESM 591. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**RESM 592. Directed Study. 1-6 Hours.**

Directed study, reading and/or research.

**RESM 593. Special Topics. 6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**RESM 595. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**RESM 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in the college teaching of resource management. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**RESM 691. Advanced Topics. 1-6 Hours.**

RESM 691. Advanced Topics. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**RESM 692. Directed Study. 1-6 Hours.**

Directed study, reading and/or research.

**RESM 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**RESM 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**RESM 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**RESM 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**RESM 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

**RESM 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

**RESM 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking course work credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

**RESM 790. Teaching Practicum. 1-3 Hours.**

Supervised practice in college teaching of agriculture. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**RESM 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**RESM 795. Independent Study. 1-9 Hours.**

Faculty Supervised study of topics not available through regular course offerings.

**RESM 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each Graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**RESM 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis (697), problem report (697), research paper or equivalent scholarly project (697), or a dissertation (797). Grading may be S/U.

## Veterinary Science (VETS)

**VETS 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**VETS 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**VETS 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

## Wildlife and Fisheries Management (WMAN)

**WMAN 512. Advanced Wildlife Population Ecology. 3 Hours.**

PR: WMAN 313 or equivalent, or consent. Case history approach to wildlife population ecology with emphasis on ungulates, gallinaceous birds, large predators; forest invertebrates and their vertebrate predators; endangered species; genetics and conservation of wildlife populations. Emphasis on current and historical literature. (3 hr. lec.).

**WMAN 534. Ecology and Management of Upland Wildlife. 4 Hours.**

PR: Consent. Ecology and management of upland game birds and mammals with emphasis on recent literature. (Offered in fall of even years.).

**WMAN 536. Ecology and Management of Wetland Wildlife. 4 Hours.**

PR: Consent. Ecology and management of waterfowl and wetland fur bears with emphasis on recent research and management literature.

**WMAN 547. Applied Wetlands Ecology and Management. 3 Hours.**

The management and ecology of wetland vegetation, soils, hydrology, and wildlife. (Cross listed as CE 547 and PLSC 547.).

**WMAN 550. Fish Ecology. 3 Hours.**

PR: WMAN 445. Study of the interrelations between fish and the biotic and abiotic environment and the influence of these interactions upon fisheries. Includes trophic dynamics, reproductive ecology, predatory-prey interactions, and anthropogenic factors.

**WMAN 593. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**WMAN 630. Conservation Genetics. 3 Hours.**

Study of population genetic concepts relevant to small fish and wildlife populations, with a focus on interpretation of the management implications of genetic data and current application of conservation genetics.

**WMAN 633. Quantitative Ecology. 3 Hours.**

PR: STAT 511 or equivalent, and WMAN 313 or equivalent. A survey of techniques and strategies for the quantitative analysis of complex ecological data sets.

**WMAN 639. Conservation Biology. 3 Hours.**

Discussion of current topics in conservation biology, the applied science of maintaining earth's biological diversity. Emphasis is on current literature with some guest lectures by topic experts.

**WMAN 640. Fish Physiology. 3 Hours.**

This course will cover all of the physiological systems in fish. Included are sensory, digestive, circulatory, nervous and endocrine, feeding, osmoregulation, movement, reproduction, and development systems.

**WMAN 641. Aquatic Toxicology. 3 Hours.**

Class will cover toxicity testing, the environmental fate of contaminants and toxicological assessment. The class will emphasize fish toxicity.

**WMAN 642. Advanced Fish Management. 3 Hours.**

Class covers important topics in fisheries assessment and management. Primary areas discussed include fish sampling, indices, and exploitation and harvest regulations.

**WMAN 643. Advanced Ichthyology. 3 Hours.**

An in-depth study of fishes, with emphasis on ecology, morphology, systematics, and zoogeography. Identification of fishes within the Appalachian region is emphasized through lab and field study.

**WMAN 644. Wildlife Data Analysis 1. 3 Hours.**

This course will cover data interpretations, statistical power, data techniques, use of correct data methods and alternatives, and interpretation of results.

**WMAN 645. Wildlife Data Analysis 2. 3 Hours.**

PR: WMAN 644. This course will cover statistical power and sample size, selection of proper methods, identify assumptions of methods and use of proper alternatives, and identify results.

**WMAN 684. Foundations and Philosophy of Research. 3 Hours.**

This course will guide students through fundamental readings in Wildlife, Fisheries, and Ecology. Students will explore philosophy of science, learn induction, deduction, retroduction, and the hypothetico-deductive method. Students will also begin formulating hypotheses and construct their own research proposals.

**WMAN 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**WMAN 692. Directed Study. 6 Hours.**

Directed study, reading, and/or research.

**WMAN 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**WMAN 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**WMAN 694A. Seminar. 1-6 Hours.**

Seminars arranged for advanced graduate students.

**WMAN 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**WMAN 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**WMAN 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).



**WMAN 770. Wildlife Seminar. 1 Hour.**

Per semester; PR: Consent. May be repeated for a maximum of 4 credit hours.) Discussion of current developments in wildlife management.

**WMAN 790. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in the college teaching of wildlife and fisheries management. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**WMAN 791. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**WMAN 792. Directed Study. 1-6 Hours.**

Directed study, reading and/or research.

**WMAN 793. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**WMAN 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading will be S/U.).

**WMAN 900. Professional Development. 1-6 Hours.**

Professional development courses provide skill renewal or enhancement in a professional field or content area (e.g., education, community health, geology). The continuing education courses are graded on a pass/fail grading scale and do not apply as graduate credit toward a degree program.

## Wood Science (WDSC)

**WDSC 690. Teaching Practicum. 1-3 Hours.**

PR: Consent. Supervised practice in the college teaching of wood science. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**WDSC 691. Advanced Topics. 1-6 Hours.**

PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**WDSC 692. Directed Study. 1-6 Hours.**

Directed study, reading and/or research.

**WDSC 693. Special Topics. 1-6 Hours.**

A study of contemporary topics selected from recent developments in the field.

**WDSC 694. Seminar. 1-6 Hours.**

Special seminars arranged for advanced graduate students.

**WDSC 695. Independent Study. 1-9 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**WDSC 696. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**WDSC 697. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading will be S/U.).

**WDSC 698. Thesis or Dissertation. 1-6 Hours.**

PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

**WDSC 699. Graduate Colloquium. 1-6 Hours.**

PR: Consent. For graduate students not seeking course work credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

**WDSC 796. Graduate Seminar. 1-3 Hours.**

PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**WDSC 797. Research. 1-9 Hours.**

PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).



**WDSC 930. Professional Development. 1-6 Hours.**

Professional development courses provide skill renewal or enhancement in a professional field or content area (e.g., education, community health, geology.) These tuition-waived continuing education courses are graded on a pass/fail grading scale and do not apply as graduate credit toward a degree program.