Davis College of Agriculture and Natural Resources

The Davis College offers students career paths that are exciting and rewarding. Through our diverse academic programs, students and faculty team up to discover agricultural practices that increase yields while improving the environment, producing bio-based energy alternatives, creating more nutritious and flavorful foods, restoring degraded ecosystems, conserving forests and natural resources, and designing both built and natural environments. Graduates of the Davis College pursue scientific and management careers that foster the wise management, utilization, and conservation of our soils, water, forests, wildlife, domestic animals, food, fiber, and living spaces, as we work toward our vision of a world sustainably fed, clothed, and sheltered.

The Davis College helps students adjust to their major and get to know their fellow students and professors. Distinguished faculty share their knowledge through hands-on learning in the field, classroom, and lab, and through academic advising. In the Davis College, we are committed to helping students succeed through a strong academic support system. Whether students are interested in animals, design, the environment, biosciences, or food and health, the Davis College is the perfect place for academic and personal growth.

Majors

At the WVU Davis College of Agriculture and Natural Resources, we pride ourselves on our small-school environment and high-quality undergraduate education – while offering all of the resources of a large university.

We're more than a college – we're a community. At the Davis College, we'll know your name (and your major – and probably your hometown, too). You'll get a personalized education with the quality and opportunities of a top research university.

SCHOOL OF AGRICULTURE AND FOOD SYSTEMS

- Animal and Nutritional Sciences
- Biochemistry
- Horticulture and Plant Sciences
- Human Nutrition and Foods

SCHOOL OF COMMUNITY AND ECONOMIC DEVELOPMENT

- Agricultural and Extension Education
- Agribusiness Management and Applied Economics
- Landscape Architecture
- Sustainable Design and Development

SCHOOL OF NATURAL RESOURCES AND THE ENVIRONMENT

- Environmental, Energy, and Land Management
- Environmental, Soil, and Water Sciences
- Forest Resources and Conservation
- Wildlife and Fisheries Resources

About the College

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 and landscape management, the College is a leader in making discoveries that change lives.

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 22 undergraduate majors, as well as 18 masters programs and seven 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.

Accredited Programs

The following programs within the College are accredited by nationally or internationally recognized organizations:

- Agricultural and Extension Education (National Council for Accreditation of Teacher Education)
- Biochemistry (American Chemical Society and American Society for Biochemistry and Molecular Biology)

- Forest Resources Management (Society of American Foresters)
- Human Nutrition & Foods (Accreditation Council for Education in Nutrition and Dietetics)
- Landscape Architecture (Society of Landscape Architecture)
- Recreation, Parks and Tourism Resources (Society of American Foresters)
- Wood Science and Technology (Society of Wood Science and Technology)

Honoraries and Student Organizations

You're encouraged to become active in honoraries and student professional associations and organizations. Within the College, outstanding students may be chosen for membership in Alpha Tau Alpha, Gamma Sigma Delta, Phi Upsilon Omicron or Alpha Zeta. There are over twenty student clubs and organizations that you can get involved with.

Multidisciplinary Studies Major

The Davis College offers a Multidisciplinary Studies major that requires completion of three minors – two from the Davis College and one in another WVU college. This major provides flexibility in defining an academic program that fits your career goals.

ADMINISTRATION

DEAN

- Jorge H. Atiles - Ph.D (Virginia Tech University)
  Director, Director, WVU Division for Land Grant Engagement

ASSOCIATE DEAN OF ACADEMIC AFFAIRS

- Kimberly M. Barnes - Ph.D. (University of Nebraska-Lincoln)
  Academic Affairs

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

FACULTY

DIVISION DIRECTORS

- Christopher M. Ashwell - Ph.D. (Wake Forest University)
  Functional genomics

Davis College of Agriculture and Natural Resources Minors

There are a wide variety of approved minors in the Davis College. Minors can be combined with major fields to broaden or further focus the student's academic studies. In addition, three minors can be combined in a Multidisciplinary Studies (MDS) major. You can earn an MDS degree in the Davis College or in other WVU colleges.

- Applied and Environmental Microbiology (http://catalog.wvu.edu/undergraduate/minors/applied_and_environmental_microbioloogy/)
- Environmental Protection (http://catalog.wvu.edu/undergraduate/minors/environmental_protection/)
- Equine Studies (http://catalog.wvu.edu/undergraduate/minors/equine_management/)
- Family and Consumer Science (http://catalog.wvu.edu/undergraduate/minors/family_and_consumer_sciences/)
- Food Science and Technology (http://catalog.wvu.edu/undergraduate/minors/food_science_and_technology/)
- Food Service Production (http://catalog.wvu.edu/undergraduate/minors/food_service_production/)
- Horticulture (http://catalog.wvu.edu/undergraduate/minors/horticulture/)
- Nutrition and Food Studies (http://catalog.wvu.edu/undergraduate/minors/nutritionandfoodstudies/)

- Pest Management (http://catalog.wvu.edu/undergraduate/minors/pest_management/)
- Soil Science (http://catalog.wvu.edu/undergraduate/minors/soil_science/)
- Landscape Studies (http://catalog.wvu.edu/undergraduate/minors/landscape_studies/)
- Rural Community Development (http://catalog.wvu.edu/undergraduate/minors/rural_community_development/)
- Sustainable Trails Development (http://catalog.wvu.edu/undergraduate/minors/sustainable_trails_dev/)
- Agribusiness Management (http://catalog.wvu.edu/undergraduate/minors/agribusiness_management/)
- Agriculture and Natural Resources Law (http://catalog.wvu.edu/undergraduate/minors/agriculturalandnaturalresourceslaw/)
- Arboriculture (http://catalog.wvu.edu/undergraduate/minors/aboriculture/)
- Conservation Ecology (http://catalog.wvu.edu/undergraduate/minors/conservation_ecology/)
- Environmental Economics (http://catalog.wvu.edu/undergraduate/minors/environmental_economics/)
- Forestry Resource Management (http://catalog.wvu.edu/undergraduate/minors/forest_resource_management/)
- Land Reclamation (http://catalog.wvu.edu/undergraduate/minors/land_reclamation/)
- Sustainable Low-Rise Residential Construction (http://catalog.wvu.edu/undergraduate/minors/sustainablelowriseresidentialconstruction/)
- Wildlife and Fisheries Resources (http://catalog.wvu.edu/undergraduate/minors/wildlife__fisheries_resourses_management/)
- Wood Science and Technology (http://catalog.wvu.edu/undergraduate/minors/wood_science_and_technology/)

Accreditation

Agricultural & Extension Education- Agricultural Teacher Education within the Davis College of Agriculture and Natural Resources has specialized accreditation through the National Council on Accreditation of Teacher Education.

Biochemistry, an intercollegiate program shared with the Eberly College of Arts and Sciences, has accreditation from both the American Chemical Society (ACS Track) and the American Society for Biochemistry and Molecular Biology (ASBMB Track)

Forest Resources Management within the Davis College of Agriculture and Natural Resources has specialized accreditation through the Society of American Foresters.

Human Nutrition & Foods within the Davis College of Agriculture, Natural Resources and Design has accreditation through the Accreditation Council for Education in Nutrition and Dietetics.

Landscape Architecture within the Davis College of Agriculture and Natural Resources has specialized accreditation through the Landscape Architecture Accreditation Board of the American Society of Landscape Architecture.

Wood Science & Technology within the Davis College of Agriculture and Natural Resources has specialized accreditation through the Society of Wood & Technology.

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Animal and Veterinary Science (A&VS)

A&VS 105. Professional Orientation. 2 Hours.
PR: Freshman standing or consent. Orientation to WVU and the academic programs in the Division of Animal and Veterinary Sciences; related career and professional opportunities. Field trips required.

A&VS 150. Introduction to Animal Science. 2 Hours.
Survey of major disciplines in animal and veterinary sciences with emphasis on related terminology; study of the development of breeds of livestock and their identification.

A&VS 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

A&VS 199. Orientation to Biochemistry. 1,2 Hour.
Orientation to degree programs and requirements, departmental resources, curriculum options, student responsibilities and opportunities.

A&VS 251. Principles of Animal Science. 4 Hours.
PR: Corequisite of A&VS 251L. A comparative study of the production of meat, milk, eggs and wool. Nutrition, physiology genetics, hygiene and physical environment, and economics are discussed as bases for sound managerial decisions.

A&VS 251L. Principles of Animal Science Laboratory. 0 Hours.
PR: Corequisite of A&VS 251. Principles of Animal Science - A&VS 251 Laboratory.

A&VS 275. Companion Animal Science. 3 Hours.
Basic physiology, nutrition and genetics; economic and ethical consideration of pet ownership; benefits of companion animals in society; aspects of handling and training, behavior, and common health diseases and parasite problems of pet animals.

A&VS 276. Service Dog Training. 3 Hours.
Current principles, theory, and practices for training service dogs.

A&VS 277L. Service Dog Training Laboratory. 1 Hour.
PR: A&VS 276 with a minimum grade of C-. Through hands-on training, students will apply their knowledge of animal training following programmatic procedures for training dogs to have basic obedience skills and perform advanced service dog tasks. Students will use the most modern, professional, and ethical techniques for training mobility-assistance and psychiatric service dogs.

A&VS 281. Introduction to Equine Care and Use. 3 Hours.
Survey of basic equine care, breeds, use, management, and behavior with a lab in equine safety and handling.

A&VS 282L. Equine Handling & Ground Training Laboratory. 1 Hour.
PR: A&VS 281. This introductory course provides students with hands-on skills to safely handle and train horses from the ground. Students will learn to identify equine body language, and understand how their body language, position, and use of aids can be used to teach horses from the ground.

A&VS 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

A&VS 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

A&VS 330. Equine Facility Design and Management. 3 Hours.
PR: A&VS 281. Design of safe, functional equine facilities. Business, legal, environmental, and other issues involved with running an equine facility.

A&VS 343. Equine Hoof and Limb. 3 Hours.
Students in this course gain in-depth knowledge of the anatomy and physiology of the equine hoof and limb. Students will study tendons, ligaments, bones, soundness, hoof structure, shoeing principles, laminitis, and navicular disease.

A&VS 370L. Riding Theory and Techniques Laboratory. 3 Hours.
PR: A&VS 282 or A&VS 282L with a minimum grade of C-. Advanced methods and techniques for performance in hunter and stock horse events; anatomical, physiological, and psychological implications; preparation of horses and riders.

A&VS 372. Careers in the Equine Industry. 3 Hours.
Provides an in-depth understanding of the careers available in the equine industry and prepares students to enter the job market.

A&VS 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

A&VS 402. Values and Ethics. 3 Hours.
PR: Senior standing or consent. Current ethical aspects in agriculture and forestry and their impact on societal values.

A&VS 404. Career Development. 1 Hour.
Identification of career opportunities and preparation of employment applications. Development of personal skills for interviewing for employment.

A&VS 409. Food Animal Diseases. 3 Hours.
PR: Junior and above or consent. General discussion of diseases, disease processes and management affecting farm animals excluding horses.

A&VS 410L. Calving Management Laboratory. 3 Hours.
PR: ANNU 260 and Junior standing. Application of current management practices for calving beef cows for early calf management and for service sire selection.

A&VS 411L. Dairy Heifer Management Laboratory. 3 Hours.
PR: ANNU 260 and Junior standing. Application of current management practices for raising dairy calves from birth through establishment of pregnancy.

A&VS 412L. Lambing Management Laboratory. 1 Hour.
PR: ANNU 260 and Junior standing. Application of current management practices for lambing ewes and lamb management from birth through first months of life.

A&VS 413. Camelid Physiology & Management. 3 Hours.
PR: Junior standing and ANNU 260. Application of current management practices for alpaca management.

A&VS 425L. Principles of Therapeutic Horsemanship 1 Laboratory. 3 Hours.
Explores the history, organization, principles, and procedures of an equine assisted activities and therapies program with the use of therapy horses for persons with disabilities.

A&VS 426L. Principles of Therapeutic Horsemanship 2 Laboratory. 3 Hours.
PR: A&VS 425 or A&VS 425L. Expand knowledge of therapeutic horsemanship based on their learning from A&VS 425. Criteria for becoming a professional in equine assisted activities and therapy fields will be emphasized.

A&VS 435. Marketing Registered Livestock. 3 Hours.
PR: Junior standing or consent. Application of strategies for marketing animals in the registered livestock industry in West Virginia and the surrounding states.

A&VS 451. Current Literature in Animal Science. 3 Hours.
PR: ANNU 260. Evaluation of current research in animal science; its application to production and management. Note: Previously listed as ANPR 250.

A&VS 461. Racehorse Industry Tour. 3 Hours.
Travel course designed to introduce students to the Thoroughbred and Standard-bred Racing Industries, including career opportunities and current events within it.

A&VS 462. Performance Horse Industry Tour. 3 Hours.
Travel course designed to introduce students to the various aspects of the Performance Horse Industry, including career opportunities and current events within it.

A&VS 463. Equine Events Management. 3 Hours.
Planning, marketing, facility preparations and horse show management necessary to run a successful nationally-sanctioned equine event.

A&VS 476L. Animal Assisted Activities and Therapy Laboratory. 3 Hours.
PR: A&VS 276. Lecture and laboratory sessions focus on Animal Assisted Activities and Therapies. Students will learn to critically evaluate the research in this area and will learn hands-on about implementing Animal Assisted Activities with varying populations.

A&VS 480. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480, the student must: (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480A. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480A, the student must: (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480B. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480B, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtained approval from the instructor assigned the course responsibility.

A&VS 480C. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480C, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480D. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480D, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480E. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480E, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtained approval from the instructor assigned the course responsibility.

A&VS 480F. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480F, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480G. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480G, the student must (1) be in good standing, (2)obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480H. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480H, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480I. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480I, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480J. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480J, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480K. Assigned Topics. 1-6 Hours.
To be eligible to register in A&VS 480K, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480L. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480L, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480M. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480M, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480N. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480N, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480O. Assigned Topics. 1-4 Hours.
To be eligible to register for A&VS 480O, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480P. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480P, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480Q. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480Q, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480R. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480R, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480S. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480S. the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480T. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480T, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480U. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480U, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480V. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480V, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480W. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480W, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480X. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480X, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480Y. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480Y, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 480Z. Assigned Topics. 1-4 Hours.
To be eligible to register in A&VS 480Z, the student must (1) be in good standing, (2) obtain approval of the instructor supervising the topic, and (3) obtain approval from the instructor assigned the course responsibility.

A&VS 481L. Volunteerism for Equine Assisted Activities and Therapies Laboratory. 3 Hours.
Discuss and demonstrate the importance of the role of the volunteer in the equine assisted activities and therapies fields.

A&VS 482. Practicum for Equine Assisted Activities and Therapies Instructor Certification. 3 Hours.
Prepares therapeutic riding instructors for certification within the guidelines fo the Professional Association of Therapeutic Horsemanship (PATH).

A&VS 486L. Advanced Service Dog Training Laboratory. 3 Hours.
PR: A&VS 276 with a minimum grade of C-. Students will train advanced commands to psychiatric and mobility service dogs in training. Topics covered include dog selection, temperament testing, training methods, and legal issues.

A&VS 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

A&VS 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

A&VS 492. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

A&VS 493. Special Topics. 6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

A&VS 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

A&VS 495. Independent Study. 1-6 Hours.
Faculty-supervised study of topics not available through regular course offerings.

A&VS 496. Senior Thesis. 1-3 Hours.
PR: Consent.

A&VS 497. Research. 1-6 Hours.
Independent research projects.

A&VS 498. Honors. 1-3 Hours.
PR: Students in honors program and consent by the honors director. Independent reading, study or research.

A&VS 499. Global Service Learning. 3 Hours.
PR: Consent. Theory and practice of global service-learning. The main objective will be to pair the experiential aspects of meaningful and sustained service in the host community with work from the student's anchor course by offering a methodological framework for cultural immersion and community service as well as adding to the content of the anchor course.

Applied and Environmental Microbiology (AEM)

AEM 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

AEM 216. Living in a Microbial World. 3 Hours.
Explores the microbial world's impact on humankind and the evolution of microorganisms from the beginning of life on Earth. Follows the journey of how these microorganisms have fundamentally shaped the world today. Students will learn about microbial diversity, the impact of microbes on human health and society, and the economic impact of microbial processes and products.

AEM 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AEM 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

AEM 341. General Microbiology. 3 Hours.
PR: CHEM 115 with a minimum grade of C- and PR or CONC: AEM 341L. Introductory morphological, cultural, and physiological characteristics of microorganisms; application of microbiology to agriculture, home economics, and health.

AEM 341L. General Microbiology Laboratory. 1 Hour.
PR or CONC: AEM 341. General Microbiology - AEM 341 Laboratory.

AEM 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AEM 401. Environmental Microbiology. 3 Hours.
PR: AEM 341 or consent and PR or CONC: AEM 401L. Microbiology as applied to soil, water, wastewater, sewage, air, and the general environment. Occurrence, distribution, ecology, and detection of microorganisms in these environments. (Also listed as ENVP 401.).

AEM 401L. Environmental Microbiology Laboratory. 1 Hour.
PR or CONC: AEM 401. Environmental Microbiology - AEM 401 Laboratory.

AEM 420. Soil Microbiology. 3 Hours.
PR: AEM 341. Microbiology and biochemistry of the soil environment. Occurrence, distribution, ecology, and detection of micro-organisms in soil. (Also listed as AGRN 420 and ENVP 420.).

AEM 445. Food Microbiology. 3 Hours.
PR: AEM 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 and technologies and predictive microbiology will be introduced.

AEM 449. Food Microbiology Lab. 1 Hour.
PR: AEM 445. 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 445.

AEM 470. Microbes and Global Change. 3 Hours.
PR: AEM 341. Microbially mediated biogeochemistry of elements important for life with an emphasis on how these processes are being impacted by anthropogenic activities.

AEM 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

AEM 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

AEM 492. Directed Study. 1-3 Hours.
Directed Study, reading, and/or research.

AEM 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AEM 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

AEM 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

AEM 496. Senior Thesis. 1-3 Hours.
PR: Consent.

AEM 497. Research. 1-6 Hours.
Independent research projects.

AEM 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Agriculture, Forestry, and Consumer Sciences (AFCS)

AFCS 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

AFCS 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AFCS 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

AFCS 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AFCS 480. Assigned Topics. 1-4 Hours.
Assigned studies of an interdisciplinary nature with a particular specialty area in agriculture and forestry. Students must be in good standing and have prior approval of a proposed outline from the division director's office.

AFCS 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

AFCS 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

AFCS 492. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

AFCS 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AFCS 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

AFCS 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

AFCS 496. Senior Thesis. 1-3 Hours.
PR: Consent.

AFCS 497. Research. 1-6 Hours.
Independent research projects.

AFCS 498. Honors. 1-3 Hours.
PR: Students in honors program and consent by the honors director. Independent reading, study or research.

AFCS 499. Global Service Learning. 1-3 Hours.
PR: Consent. Theory and practice of global service learning. The main objective will be to pair the experiential aspects of meaningful and sustained service in the host community with work from the student's anchor course by offering methodological framework for cultural immersion and community service as well as adding to the content of the anchor course.

Agricultural Biochemistry (AGBI)

AGBI 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

AGBI 199. Orientation to Biochemistry. 1,2 Hour.
Orientation to degree programs and requirements, departmental resources, curriculum options, student responsibilities and opportunities.

AGBI 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGBI 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

AGBI 386. Undergraduate Research Experience 1. 1,2 Hour.
PR: At least sophomore standing and faculty permission. Students will write a research proposal, conduct supervised research, and write a progress report. This course is the first of a two-course sequence that leads to a research-based capstone experience. Students must also complete AGBI 486 for this to serve as the Biochemistry Capstone course.

AGBI 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGBI 401. Senior Seminar in Biochemistry. 1 Hour.
PR: Senior standing in biochemistry. Students select a topic at the forefront of biochemistry and gather information on the subject. Students then read, critically evaluate, write about the subject and present the topic in a seminar.

AGBI 403. Applied Biochemistry Literature. 3 Hours.
PR: Senior standing. Biochemistry Capstone Experience involving literature review, grant writing, and orally defending a proposal.

AGBI 410. Introductory Biochemistry. 3 Hours.
PR: CHEM 231 or (CHEM 233 and CHEM 233L). Introduction to chemistry of cellular constituents (proteins, amino acids, carbohydrates, lipids, nucleic acids, enzymes and coenzymes) and their metabolism in animals and plants.

AGBI 410L. Introduction to Biochemistry Laboratory. 1 Hour.
PR or CONC: AGBI 410 or consent. Classic and modern techniques in biochemistry.

AGBI 420. Principles of Biochemistry 2. 3 Hours.
PR: (CHEM 462 and CHEM 462L) with a minimum grade of C- in both and PR or CONC: BIOL 219. In this course, students will study metabolic pathways and their regulation as they relate to the four main classes of biomolecules: Carbohydrates, Lipids, Proteins, and Nucleic Acids. This course serves as the second of a two-semester biochemistry sequence required of all biochemistry majors.

AGBI 420L. Principles of Biochemistry 2 Laboratory. 1 Hour.
PR or CONC: AGBI 420 with a minimum grade of C-. Laboratory study of cellular constituents and their metabolism in animals and plants.

AGBI 480. Assigned Topics. 1-4 Hours.

AGBI 486. Undergraduate Research Experience 2. 2-4 Hours.
PR: AGBI 386 and faculty permission. Continuation of a research-based Capstone Experience where students will conduct supervised research, present their research, and prepare a final report. This course is the second of a two-course research-based sequence and must be completed after AGBI 386 to count as the capstone experience.

AGBI 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

AGBI 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

AGBI 492. Directed Study. 1-3 Hours.
Directed study, reading, and or research.

AGBI 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGBI 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

AGBI 495. Independent Study. 1-6 Hours.
Faculty-supervised study of topics not available through regular course offerings.

AGBI 496. Senior Thesis. 1-3 Hours.
PR: Consent.

AGBI 497. Research. 1-6 Hours.
Independent research projects.

AGBI 498. Honors. 1-3 Hours.
PR: Students in honors program and consent by the honors director. Independent reading, study or research.

Agriculture and Extension Education (AGEE)

AGEE 101. Global Food and Agricultural Industry. 3 Hours.
Examination of the history and current developments, structures, functions, and importance of the international food and agricultural industry; issues, concerns and interrelationships and their impacts on American agriculture and society.

AGEE 102. Educational Colloquium in Agricultural and Extension Education. 1 Hour.
Components of and requirements for majoring in agricultural and extension education, including specializations, professional organizations, avenues to program completion, and requirements to be gainfully employed.

AGEE 103S. Basics of Agricultural Mechanization. 3 Hours.
Study and application of the foundation area associated with agricultural mechanization.

AGEE 110. Microcomputer Applications in Agricultural Education. 3 Hours.
PR: Consent. Microcomputer applications in the instructional process of agricultural education; use of applications software, agricultural software, and data bases; and methods of integrating microcomputers into secondary school agriculture and extension programs.

AGEE 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

AGEE 202. Site Based Tutoring in Agriculture and Extension Education. 1 Hour.
Application of models and paradigms of learning in the content area through tutoring of individuals and small groups in an assigned public school setting.

AGEE 203. Agriculture Mechanics Practica. 3 Hours.
Theory and practice of designing and constructing structures, electrical circuits, masonry, equipment maintenance, and surveying.

AGEE 220. Group Organization and Leadership. 3 Hours.
Study of the impact of leaders and organized groups on societies. Role of groups in conveying cultural norms. Principles and techniques involved in forming and directing organizations in providing effective leadership.

AGEE 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGEE 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

AGEE 303. Small Engines and Hydraulics. 3 Hours.
Theory and practice of disassembling, assembling and maintaining small gasoline engines and hydraulic devices.

AGEE 305. Metal Fabrication. 3 Hours.
Theory and practice of the fusion of metals. Advancing the science, technology and application of welding and allied processes including: joining, brazing, soldering, and cutting.

AGEE 330. Shop Theory and Methods. 3 Hours.
PR: AGEE 103 and AGEE 203. Methods of teaching agricultural mechanics including laboratory safety, organization and supervision.

AGEE 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGEE 421. Agricultural and Natural Resource Communications. 3 Hours.
Procedures and practices in developing, interpreting, and communicating agricultural and natural resource information; emphasis on visual materials and effective presentations. (3 hr. lec.).

AGEE 426. Directing Future Farmers of America and Supervised Agricultural Experiences. 3 Hours.
This course is specifically designed for students preparing to teach agricultural science in the public schools. Focus will be on planning, advising, supervising and evaluating student educational experiences through FFA and supervised agricultural experience programs.

AGEE 430. Methods of Teaching Agriculture. 2 Hours.
PR or CONC: AGEE 430L with a minimum grade of C- or consent. Organization and preparation for teaching agriculture in middle and secondary schools.

AGEE 430L. Methods of Teaching Agriculture Laboratory. 1 Hour.
PR or CONC: AGEE 430. Methods of Teaching Agriculture - AGEE 430 Laboratory.

AGEE 431. Adult Education in Agriculture and Natural Resources. 2 Hours.
PR: Consent. Planning and preparation for teaching adult classes and advising agricultural organizations.

AGEE 434. Managing Learning Environment. 3 Hours.
PR: AGEE 430 or consent. Principals/process in organizing and managing all components of the secondary agricultural education learning environment to maximize student achievement.

AGEE 438. Agriculture Education Curriculum Development. 2 Hours.
Development, organization, preparation and evaluation of materials/curriculum for teaching agriculture in middle and secondary schools.

AGEE 440. Principles of Cooperative Extension. 2 Hours.
PR: Consent. History, philosophy, and mission of the cooperative extension service. Roles and functions of extension faculty in developing and presenting extension programs.

AGEE 441. Methods in Extension Education. 2 Hours.
PR: Consent. Organization and preparation for extension teaching and the processes of communication.

AGEE 452. Advanced Farm Machinery. 3 Hours.
Systems approach to selection, use and operation of machinery related to agriculture, forestry and other rural activities. Emphasis on safety and environmental impact. Use of records for management decisions, purchase, replacement, sale, or overhaul. (2 hr. rec., 3 hr. lab.).

AGEE 454. Agricultural Mechanics Problems. 1-4 Hours.
PR: C or better in an AGEE course. Special projects and problems in theoretical analysis, design, or construction. (1-4 hr. conference.).

AGEE 454A. Agricultural Mechanics Problems. 1-4 Hours.
PR: C or better in an AGEE course. Special projects and problems in theoretical analysis, design or construction. (1-4 hr. conference.).

AGEE 454B. Agricultural Mechanics Problems. 1-4 Hours.
PR: C or better in an AGEE course. Special projects and problems in theoretical analysis, design, or construction. (1-4 hr. conference.).

AGEE 454C. Agricultural Mechanics Problems. 1-4 Hours.
PR: C or better in an AGEE course. Special projects and problems in theoretical analysis, design, or construction. (1-4 hr. conference.).

AGEE 454D. Agricultural Mechanics Problems. 1-4 Hours.
PR: C or better in an AGEE course. Special projects and problems in theoretical analysis, design, or construction. (1-4 hr. conference.).

AGEE 454E. Agricultural Mechanics Problems. 1-4 Hours.
PR: C or better in an AGEE course. Special projects and problems in theoretical analysis, design, or construction. (1-4 hr. conference.).

AGEE 454F. Agricultural Mechanics Problems. 1-4 Hours.
PR: C or better in an AGEE course. Special projects and problems in theoretical analysis, design, or construction. (1-4 hr. conference.).

AGEE 454G. Agricultural Mechanics Problems. 1-4 Hours.
PR: C or better in an AGEE course. Special projects and problems in theoretical analysis, design, or construction. (1-4 hr. conference.).

AGEE 454H. Agricultural Mechanics Problems. 1-4 Hours.
PR: C or better in an AGEE course. Special projects and problems in theoretical analysis, design, or construction. (1-4 hr. conference.).

AGEE 454I. Agricultural Mechanics Problems. 1-4 Hours.
PR: C or better in an AGEE course. Special projects and problems in theoretical analysis, design, or construction. (1-4 hr. conference.).

AGEE 460. Engineering Technology for Urban Watersheds and Irrigation. 3 Hours.
Soil and water management; analysis of small watersheds and design of waterways, culverts, ponds, sediment basins, and turf irrigation systems. (3 hr. lec.).

AGEE 461. Waste Management-Composting. 3 Hours.
Both present and alternative waste management strategies will be examined. Students will learn how to analyze the waste stream and be able to develop management concepts which are both economically and environmentally sound. Lectures by waste management professionals will be integrated into the class to expose the students to the very latest practices and technology.

AGEE 488. Professional Agricultural Internship. 1-12 Hours.
PR: Consent.

AGEE 489. Agriculture and Extension Education Reflective Seminar. 1 Hour.
Provides opportunities for students to examine their field based experiences. Professional issues and problems are identified and discussed. Ethics and misconceptions about professional practice are examined.

AGEE 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

AGEE 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

AGEE 492. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

AGEE 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGEE 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

AGEE 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

AGEE 496. Senior Thesis. 1-3 Hours.
PR: Consent.

AGEE 497. Research. 1-6 Hours.
Independent research projects.

AGEE 498. Honors. 1-3 Hours.
PR: Students in honors program and consent by the honors director. Independent reading, study or research.

Agriculture(AGRL)

AGRL 111. Professions in Agriculture. 1 Hour.
An overview of subject matter related to agriculture in current society. Emphasis on agricultural organizations, environmental and food issues, careers, and programs within the college.

AGRL 112. Professions in Agriculture. 1 Hour.
Continuation of AGRL 111.

AGRL 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

AGRL 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGRL 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

AGRL 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGRL 400. Agricultural Travel Course. 1-6 Hours.
Tour and study of production methods in major livestock and crop regions of the United States and other countries. Influence of population, climate, soil, topography, markets, labor, and other factors on agricultural production.

AGRL 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

AGRL 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

AGRL 492. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

AGRL 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGRL 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

AGRL 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

AGRL 496. Senior Thesis. 1-3 Hours.
PR: Consent.

AGRL 497. Research. 1-6 Hours.
Independent research projects.

AGRL 498. Honors. 1-3 Hours.
PR: Students in honors program and consent by the honors director. Independent reading, study or research.

Agronomy (AGRN)

AGRN 120. Principles of Agroecology. 3 Hours.
Agroecology is the study of interactions among organisms and the environment in agricultural systems and broader interactions with the biosphere to meet human needs and provide ecosystem services while minimizing their ecological footprint. We will explore the structure and function of agroecosystems across a range of climate, landscape/soil, and crop and animal components.

AGRN 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGRN 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

AGRN 315. Turfgrass Management. 3 Hours.
PR: AGRN 202 and AGRN 203 and PLSC 206 or consent. Establishment, maintenance and adaptation of grasses for lawns, golf courses, parks, athletic and playing fields, and roadsides. Associating differential plant responses with soil, climatic and biotic factors. (3 hr. lec.).

AGRN 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGRN 451. Principles of Weed Science. 2 Hours.
PR: ESWS 202 and ESWS 202L and PLSC 206 or consent and PR or CONC: AGRN 451L. Fundamental principles of weed science including identification, ecology, and control in crops. (Also listed as ENVP 451.).

AGRN 451L. Principles of Weed Science Laboratory. 1 Hour.
PR or CONC: AGRN 451. Principles of Weed Science - AGRN 451 Laboratory.

AGRN 452. Grain and Special Crops. 3 Hours.
PR: PLSC 206 and AGRN 202 and AGRN 203 or consent. Advanced study of methods in the production of grain and special crops. Varieties, improvement, tillage, harvesting, storage, and use of crops grown for seed or special purposes.

AGRN 454. Forage Crops. 3 Hours.
PR: PLSC 206 and AGRN 202 and AGRN 203 or consent. All phases of forage crop science including ecology, taxonomy, management practices used for the production of forage and seed, and forage composition, quality, and utilization. (3 hr. lec, 1 hr. lab.).

AGRN 480. Field Methods and Case Studies in Agroecology. 3 Hours.
PR: AGRN 120 and PLSC 206 and BIOL 350 and AGRN 410 and ENTO 404 and PPTH 401. This is a capstone course for the Agroecology major. The main goal of the course is to develop independent thinkers and professionals in the field of agroecology, including proficiency in use of field and analytical methods for assessment of the structure and function of agroecosystems and support of management decisions.

AGRN 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

AGRN 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

AGRN 492. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

AGRN 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

AGRN 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

AGRN 495. Independent Study. 1-6 Hours.
Faculty-supervised study of topics not available through regular course offerings.

AGRN 496. Senior Thesis. 1-3 Hours.
PR: Consent.

AGRN 497. Research. 1-6 Hours.
Independent research projects.

AGRN 498. Honors. 1-3 Hours.
PR: Students in honors program and consent by the honors director. Independent reading, study or research.

Animal Nutrition (ANNU)

ANNU 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

ANNU 260. Animal Nutrition. 3 Hours.
PR: Two courses in chemistry. Digestion and metabolism of food nutrients, nutrient requirements of farm animals, and nutritive values of feeds and rations.

ANNU 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ANNU 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

ANNU 361. Applied Nutrition. 3 Hours.
PR: ANNU 260. Feedstuffs, feed processing storage and additives, nutrient requirements and ration formulation for beef and dairy cattle, sheep, and horses. (2 hr. lec., 1 hr. lab.).

ANNU 362. Applied Nutrition 2. 3 Hours.
PR: ANNU 260. Applied feeding practices, nutrient requirements and ration formulation for poultry, swine, laboratory and companion animals. (2 hr. lec., 1 hr. lab.).

ANNU 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ANNU 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

ANNU 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

ANNU 492. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

ANNU 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ANNU 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

ANNU 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

ANNU 496. Senior Thesis. 1-3 Hours.
PR: Consent.

ANNU 497. Research. 1-6 Hours.
Independent research projects.

ANNU 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Animal Physiology (ANPH)

ANPH 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ANPH 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

ANPH 301. Introduction to Animal Physiology. 3 Hours.
PR: BIOL 102 or consent. The function and regulation of the principal systems of the animal body.

ANPH 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ANPH 400. Growth and Lactation Physiology. 3 Hours.
PR: ANPH 301 or consent. Animal life cycles; nature of growth and lactation; effects of biological, environmental, and social-psychological variants; physiological regulation and control.

ANPH 405L. Animal Physiology Laboratory. 2 Hours.
PR: ANPH 301 or consent. Laboratory study of the physiological systems of animals and the influences of environment on these systems.

ANPH 424. Physiology of Reproduction. 3 Hours.
PR: Course in biology. Comparative physiology of reproduction in higher animals; endocrine functions involved in reproduction; genetic and environmental variations in fertility mechanisms.

ANPH 424L. Reproductive Laboratory. 1 Hour.
PR or CONC: ANPH 424 and junior standing or consent. Laboratory study of the anatomy and function of the reproductive physiology system in animals.

ANPH 426. Applied Animal Reproduction. 1 Hour.
PR or CONC: ANPH 424 and junior standing or consent. Laboratory study, including rectal pregnancy examination, of reproductive physiology system in animals.

ANPH 430. Breeding of Farm Animals. 3 Hours.
PR: Course in genetics or consent. Application of principles of quantitative genetics to the improvement of farm animals.

ANPH 440. Equine Exercise Physiology. 3 Hours.
PR: A&VS 281 and ANPH 301. Evaluation of research in equine exercise science; physiological and mental adaptation to training; performance nutrition; unsoundness during training and competition; management and training regimes.

ANPH 480. Behavioral Patterns of Animals. 3 Hours.
Examination of the bases for exhibition and control of behavioral patterns of domesticated and nondomesticated species. (2 hr. lec., 3 hr. lab.).

ANPH 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

ANPH 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

ANPH 492. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

ANPH 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ANPH 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

ANPH 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

ANPH 496. Senior Thesis. 1-3 Hours.
PR: Consent.

ANPH 497. Research. 1-6 Hours.
Independent research projects.

ANPH 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Animal Production (ANPR)

ANPR 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ANPR 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

ANPR 308. Animal Production Experience. 1-4 Hours.
Experience in operating a dairy or livestock farm, including layers or broilers, calving, lambing, or farrowing of hogs. (Can be repeated up to a maximum of 4 credits. 3 hr. lab./ per hr. of credit.).

ANPR 336. Dairy Cattle History and Selection. 3 Hours.
To familiarize the student with the breeds of dairy cattle as well as modern concepts in phenotype and performance record evaluation. (2 labs.).

ANPR 338L. Horse/Livestock/Poultry Evaluation Laboratory. 3 Hours.
Appraisal of horses, cattle, sheep, poultry, and swine. Evaluation of scientific techniques used in selecting those species. Tours of representative flocks, herds and stables will be required.

ANPR 339L. Advanced Evaluation of Animal Products Laboratory. 1-4 Hours.
PR: ANPR 336 or ANPR 338 or ANPR 338L or consent. Advanced selection, evaluation and grading of domestic livestock species and animal products. Tours of representative flocks, herds and processing plants will be required. (Can be repeated up to a maximum of 4 credits.).

ANPR 341. Beef Production. 3 Hours.
PR: ANNU 260. Applying the principles of breeding, nutrition, physiology, and economics for the production of beef cattle.

ANPR 341L. Beef Production Laboratory. 1 Hour.
PR or CONC: ANPR 341. Experiences in beef cattle management, including feeding, handling, health programs and farm visits.

ANPR 344L. Advanced Horse Management Laboratory. 4 Hours.
PR: A&VS 281. Application of scientific principles and concepts in genetics, breeding, nutrition, reproduction, and anatomy to efficient production and management of horses.

ANPR 350. Milk Production. 3 Hours.
PR: Corequisite of ANPR 350L. This is a course on dairy cattle management. Topics will include an introduction to the US dairy industry, dairy breeds, nutrition and feeding, genetics and breeding, reproduction, raising of replacement animals, dairy facilities, mammary gland anatomy and milk quality, herd health, and general management of the dairy herd.

ANPR 350L. Milk Production Laboratory. 0 Hours.
Coreq: ANPR 350. Milk Production - ANPR 350 Laboratory.

ANPR 353. Pork Production. 3 Hours.
PR: ANNU 260. Physiological and economical bases of pork production. (2 hr. lec., 3 hr. lab.).

ANPR 356. Small Ruminants. 3 Hours.
PR: ANNU 260. Genetics, nutrition, physiology, health and management of small ruminants in production of fiber, meat and milk, in local, regional and global contexts.

ANPR 356L. Small Ruminants Laboratory. 0 Hours.
Coreq: ANPR 356. Small Ruminants - ANPR 356 Laboratory.

ANPR 367. Poultry Production. 3 Hours.
PR: ANNU 260. Special phases of broiler and egg production, disease control, labor-saving studies, and recent designs in housing and equipment for all types of poultry.

ANPR 367L. Poultry Production Laboratory. 1 Hour.
PR or CONC: ANPR 367. Laboratory study of poultry production systems, related feed manufacturing and product processing practices.

ANPR 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ANPR 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

ANPR 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

ANPR 492. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

ANPR 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ANPR 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

ANPR 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

ANPR 496. Senior Thesis. 1-3 Hours.
PR: Consent.

ANPR 497. Research. 1-6 Hours.
Independent research projects.

ANPR 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Agriculture Natural Resources and Design (ANRD)

ANRD 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

ANRD 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ANRD 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

ANRD 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

ANRD 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

Agriculture and Resource Economics (ARE)

ARE 110. Agribusiness Accounting. 3 Hours.
Introduction to accounting for agricultural, rural, and small business managers. Emphasis on the accounting cycle, analysis and interpretation of financial statements, income taxes, and managerial accounting. (Students having prior college credit in accounting are not eligible for this course.).

ARE 150. Introductory Agricultural and Agribusiness Economics. 3 Hours.
Introduction to basic agricultural economics and agribusiness concepts, and the application of these concepts to agricultural and agribusinesses issues.

ARE 187. Energy Resource Economics. 3 Hours.
Dilemmas posed for developing and modern societies by rising energy demands amid concerns for the world's environment. Economics of fuel sources and technologies, and historical and new concerns over resource scarcities.

ARE 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

ARE 199. Orientation to Agriculture and Resource Economics. 1,2 Hour.
Orientation to degree programs and requirements, departmental resources, curriculum options, student responsibilities and opportunities.

ARE 201. Principles of Resource and Energy. 3 Hours.
PR: Third-year standing. Analyzes problems important or peculiar to mineral industry economics; exhaustion, externalities, risks, production cycle, industry structure, pricing, role of minerals in development and trade, resource planning. Energy, metals, industrial minerals. (3 hr. lec.).

ARE 204. Agribusiness Management. 3 Hours.
Overview of the agribusiness decision-making process, and the functions of agribusiness management; analysis of financial statements and budgeting for evaluating profitability of alternative enterprises and practices.

ARE 220. Introductory Environmental and Resource Economics. 3 Hours.
Economic analysis of environmental pollution, natural resource conservation and management, outdoor recreation, public land use, wildlife resources, water use, property rights, and benefit-cost issues.

ARE 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ARE 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

ARE 360. Current Issues In Agriculture. 3 Hours.
Course focusing on the current scientific, ethical, legal, economic and political issues relating to agriculture. Students conduct group and individual research, discuss topics in an informal debate format and summarize positions in a written form.

ARE 380. Agribusiness Sales and Management. 3 Hours.
This course is designed to provide students with essential spreadsheet and sales skills they can apply regardless of their chosen profession. The course will cover spreadsheet basics and students will apply that knowledge to problems related to agricultural and resource economics.

ARE 382. Agricultural and Natural Resources Law. 3 Hours.
Introduction to legal concepts, principles and practices related to environmental, natural resource, and agricultural issues; in the context of the legal system within which statues are enacted, administered and enforced.

ARE 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ARE 401. Applied Demand Analysis. 3 Hours.
Consumer demand economics applied to environmental, natural resource, and agricultural issues; analysis of factors that influence demand and determine prices; special applications to non-market, environmental, and natural resource amenities.

ARE 406. Applied Quantitative Methods. 3 Hours.
PR: ARE 150. Application of basic quantitative concepts and methods applied to agribusiness and natural resources. Topics include applied economics, statistics, mathematics, and financial concepts and decision-making tools for determining optimum allocation of resources for production processes.

ARE 410. Environmental and Resource Economics. 3 Hours.
PR: ARE 220. Economic analysis of natural resource and environmental problems; management of renewable and non-renewable resources and environmental amenities; market failure, externalities, benefit-cost and risk analysis; property rights and the taking issues.

ARE 411. Rural Economic Development. 3 Hours.
Economic trends, development policies, and analysis of rural economies in the United States. Rural diversity, development concepts, rural planning, public programs and policies, and community analysis methods.

ARE 420. Adaptation and Mitigation Strategies for Addressing Climate Change. 3 Hours.
PR: Junior or Senior standing. 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 422. New Venture Creation. 3 Hours.
In this course, students will learn the process of starting a new venture. The student will gain an in depth understanding of the framework and process by practicing the techniques on a startup of the student's choice.

ARE 431. Marketing Agricultural Products. 3 Hours.
Organization, functions, and analysis of the agricultural marketing system. Food consumption, exports, price analysis, marketing costs, market power, commodities futures market, food safety, and government regulations.

ARE 435. Marketing Livestock Products. 3 Hours.
Livestock marketing practices and policies. Supply and demand, livestock price cycles, grading, marketing alternatives, processing and retailing. Economic analysis of alternatives, current issues, and trends.

ARE 440. Futures Markets and Commodity Prices. 3 Hours.
Analysis of price-making forces which operate in the market place; emphasis on major agricultural and mineral commodity and futures markets.

ARE 445. Energy Economics. 3 Hours.
Analysis of the energy sector and its relationship to the rest of the economy; energy security, deregulation, full cost pricing, substitutability among energy sources, transmission, new technologies, environmental considerations.

ARE 450. Agriculture, Environmental and Resource Policy. 3 Hours.
PR: ARE 150 or ARE 220 or ECON 201 or consent. Economic analysis of agricultural, natural resource and environmental policies; problems of externalities and market failure, and alternative policies for addressing such problems; benefits and cost of alternative policies.

ARE 461. Agribusiness Finance. 3 Hours.
PR: ACCT 201 or ARE 110. An overview of financial analysis and the application of financial principles to small, rural and agricultural businesses. Includes applications of financial analysis computer software.

ARE 462. Records and Analysis for Sustainable Agribusinesses. 3 Hours.
PR: ARE 110 or ACCT 201 or BUSA 202. Managerial and record-keeping concepts and tools needed to run a successful agribusiness. Course materials and lab activities focus on collection and use of information to assist in whole-farm/agribusiness planning, decision-making, performance evaluation, sensitivity analysis, and management. Course stresses the impact of record-keeping and performance evaluation on the ability of an agribusiness to achieve its strategic goals.

ARE 482. Enterprise Operation Law. 3 Hours.
Course focusing on laws applicable to businesses and the management of risks associated with operating a business. Students will learn to read and interpret laws and apply them to real-life business scenarios.

ARE 484. Agribusiness Strategic Management. 3 Hours.
PR: Senior standing. This course is designed to enhance understanding of business strategy formulation and implementation. The course provides a balance between theoretical concepts, principles, and practice of agribusiness management. Case studies are used to illustrate the crafting, implementation, and execution of optimal strategies.

ARE 485. 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 consent. Allocation under scarcity, water institutions and management, risk, pricing, marketing, demand and supply estimation, interdependence between energy and water resources (Credit cannot be received for both ARE 485 and ARE 585).

ARE 488. Career Development. 1 Hour.
PR: For Resource Economics and Management majors only. Development of career goals and job search skills. Investigation of topics that advance students in their career goals.

ARE 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

ARE 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

ARE 492. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

ARE 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ARE 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

ARE 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

ARE 496. Senior Thesis. 1-3 Hours.
PR: Consent.

ARE 497. Research. 1-6 Hours.
Independent research projects.

ARE 498. Honors. 1-3 Hours.
PR: Students in honors program and consent by the honors director. Independent reading, study or research.

Environmental and Community Planning (ENCP)

ENCP 460. Sustainable Cities: Best Practices. 3 Hours.
Surveys basic concepts, theories, and metrics of measuring and evaluating the trends of urban sustainability; it profiles influential urban design and planning visionaries; and examines best practices in developing sustainable, smart, and resilient human-made space at the scale of a site, neighborhood, community, city, and region.

ENCP 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

Energy Land Management (ENLM)

ENLM 150. Introduction to Environmental, Energy, and Land Management. 3 Hours.
Overview of land management and procurement careers including environmental, energy, and public infrastructure. Addresses the technical concepts and career opportunities in each area. Emphasis on providing guidance for success in completing undergraduate studies. Course will also introduce land development processes related to environmental and conservation opportunities as well as a multitude of energy sources.

ENLM 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

ENLM 200. Principles of Environmental, Energy, and Land Management. 3 Hours.
The science of land management with emphasis on the administration of land resources associated with environmental management and energy development. Recognition of complexities in land development and examination of ownership management techniques in traditional and renewable energy systems.

ENLM 220. Energy Production & Operations. 3 Hours.
Overview of land development with a focus on technical and cost details associated with energy and related systems. Includes an overview of energy units and production terminology as well as an understanding of the techno-economic aspects related to the development. Will also cover land resources needed for each development and how land cost and availability factor into decision making processes.

ENLM 250. Managing Non-Technical Risks. 3 Hours.
Identification, management, and communication of social risks in energy management. Exploration of media relations, crisis communication, advocacy, community education, and government relations as they relate to the energy industry. Risk management and communication skills development through case studies, presentations, and experiential exercises.

ENLM 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ENLM 300. Ethics and Negotiations for Land Managers. 3 Hours.
This course provides an overview of the fundamental components of negotiation, with a particular focus on negotiating positions, techniques, and styles, as they pertain to land-based negotiations. The course emphasizes the importance of considering the legal, social, and ethical aspects of negotiation in the context of contemporary land, energy, environmental, and sustainable energy scenarios.

ENLM 390. Land and Lease Analysis. 3 Hours.
PR: ENLM 200 with a minimum grade of C-. This course will cover the theory and practice of real property title and genealogical research. Students will be required to complete and construct a mineral title packet; demonstrate analysis and drafting of energy and land related leases; and develop a solid foundation in heirship research. Students will also develop skills managing complex land records using software systems.

ENLM 393. Special Topics. 1-6 Hours.
Investigation of topics not covered in regularly scheduled courses.

ENLM 400. Land Management Contracts 1. 3 Hours.
PR: ENLM 300 with a minimum grade of C-. Introduction to mineral and environmental law with specific emphasis on titles, deeds, and leasing instruments commonly used in an exploration effort. Examination of land ownership, estates, land measurement, and leasing including a broad overview of the role of the land manager during the exploration and development of energy resources.

ENLM 415. Midstream Energy Planning and Development. 3 Hours.
The science of midstream energy with a focus on site and transportation infrastructure development and best management practices for minimizing potential surface and water impacts. Students will review complexities of energy systems with an emphasis on procuring rights and agreements, the regulatory framework, and techniques for reducing environmental impacts of midstream development in both traditional and renewable energy systems.

ENLM 420. Land Management Contracts 2. 3 Hours.
Continuation of energy contracts with emphasis on lease examination, execution, payment, and development. Complexities of lease management and permitting including an overview of federal, state, and local regulations and how they pertain to energy development.

ENLM 430. Nature-Based Land Development. 3 Hours.
This course focuses on developing and evaluating land for nature-based solutions. Students will explore innovative approaches to harness nature's potential for sustainable development, emphasizing nature-based carbon programs, bioenergy and bioproducts opportunities, biodiversity credits, and financing strategies. Through collaborative learning and practical projects, students will gain the skills needed to be a leader in nature-based development.

ENLM 441. Applied Geographic Information Systems and Energy Land Management. 1 Hour.
PR or CONC: RESM 440. Use of Geographic Information Systems (GIS) foundations to solve problems related directly to Energy Land Management. Incorporation of GIS skills in a holistic manner to develop spatial solutions to a real-world challenge in the planning, acquisition, and development of a petroleum/natural gas resource play.

ENLM 442. GIS Skills for Energy Land Management. 3 Hours.
PR: ENLM 200 with a minimum grade of C-. This class will provide students with background in the use of fundamental GIS skills to solve problems directly related to Energy Land Management. GIS skills will be used to develop spatial solutions to a real-world challenge in the planning, acquisition, and development of a petroleum/natural gas resource play.

ENLM 450. Land Management Strategic Planning. 3 Hours.
PR: ENLM 420 with a minimum grade of C-. This course will prepare students for the challenges faced when developing land and natural resources from initial definition to production, to division orders and revenue distribution. This course is designed to provide students with a comprehensive understanding of the complexities of developing land and natural resources, with a focus on responsible and sustainable operational practices.

ENLM 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

ENLM 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated for a maximum of 18 Hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

ENLM 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ENLM 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

ENLM 496. Senior Thesis. 1-3 Hours.
PR: Consent.

ENLM 497. Research. 1-6 Hours.

Entomology (ENTO)

ENTO 101. Bugs and Humans. 3 Hours.
"Bugs" or insects will be related to humans; their impact on human civilization and religion, the impact of insect-borne diseases on human society and history, development of insect societies, and edible insects will be presented.

ENTO 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ENTO 301. Apiculture. 3 Hours.
PR: BIOL 101 and BIOL 103 and BIOL 102 and BIOL 104. Development, physiology, and behavior of the honey bee with emphasis on colony management, pollination of crops, diseases of bees, properties of honey and beeswax, and marketing of honey bee products.

ENTO 302. Apiculture Laboratory. 1 Hour.
PR or CONC: ENTO 301. Identification and anatomy of honey bees, assembly and use of beekeeping equipment, field management of honey bees, examination for diseases and pests, production of queens and nuclei. (1-3 hr. lab.).

ENTO 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ENTO 401. Forensic Entomology. 3 Hours.
Study of entomology in legal investigations; processing of specimens at crime scene /morgue; identification of arthropods from forensic cases; determination of post-mortem intervals; evaluation of case studies.

ENTO 404. Principles of Entomology. 3 Hours.
PR: (BIOL 101 and BIOL 101L and BIOL 102 and BIOL 102L) or (BIOL 115 and BIOL 115L) and PR or CONC: ENTO 404L. Basic course dealing with the anatomy, morphology, physiology, reproduction, systematics, ecology, and management of insects.

ENTO 404L. Principles of Entomology Laboratory. 1 Hour.
PR or CONC: ENTO 404. Principles of Entomology - ENTO 404 Laboratory.

ENTO 412. Pest Management. 4 Hours.
PR: ENTO 404 or consent. An in-depth look at current problems and solutions in controlling insect pests in an environmentally compatible manner. Management techniques include cultural, mechanical, physical, biological, regulatory, and chemical practices. (Also listed as ENVP 412.).

ENTO 450. Insect Ecology. 3 Hours.
PR: ENTO 404 or consent. Ecology of insects as individuals, populations, and components of communities and ecosystems. Emphasis on the role of insects in agroecosystems and applications of insect ecology.

ENTO 470. Forest Pest Management. 4 Hours.
PR: FMAN 311 and (BIOL 101 and BIOL 103 and PLSC 206) or (BIOL 115 and and BIOL 117). Relationship of insects and disease organisms to the forest ecosystem; recognition of agents that affect forest health; management strategies for regulating their damage. (Also listed as PPTH 470.).

ENTO 471. Urban Tree and Shrub Health. 1 Hour.
PR: PPTH 470 or ENTO 470 or (PPTH 401 and ENTO 404). Presents the unique problems associated with managing trees and woody shrubs in an urban environment; management options will be evaluated.

ENTO 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

ENTO 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

ENTO 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ENTO 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

ENTO 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

ENTO 496. Senior Thesis. 1-3 Hours.
PR: Consent.

ENTO 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Environmental Protection (ENVP)

ENVP 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

ENVP 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ENVP 401. Environmental Microbiology. 3 Hours.
PR: AEM 341 or consent and PR or CONC: ENVP 401L. Microbiology as applied to soil, water, wastewater, sewage, air, and the general environment. Occurrence, distribution, ecology, and detection of microorganisms in these environments. (Also listed as AEM 401.).

ENVP 401L. Environmental Microbiology Laboratory. 1 Hour.
PR or CONC: ENVP 401. Environmental Microbiology - ENVP 401 Laboratory.

ENVP 412. Pest Management. 3 Hours.
PR: ENTO 404 or consent. An in-depth look at current problems and solution in controlling insect pests in an environmentally compatible manner. Management techniques include cultural, mechanical, physical, biological, regulatory, and chemical practices. (Also listed as ENTO 412.).

ENVP 415. Hazardous Waste Training. 3 Hours.
PR: Corequisite of ENVP 415L. Introduction to hazardous waste training. Lectures and hands-on experience with health and safety plan development, selecting personal protective equipment, air monitoring, incident command, site characterization, decontamination and toxicology. Includes two full-scale disaster exercises.

ENVP 415L. Hazardous Waste Training Laboratory. 0 Hours.
Coreq: ENVP 415. Hazardous Waste Training - ENVP 415 Laboratory.

ENVP 420. Soil Microbiology. 3 Hours.
PR: AEM 341. Microbiology and biochemistry of the soil environment. Occurrence, distribution, ecology, and detection of microorganisms in soil. (Also listed as AEM 420 and AGRN 420.).

ENVP 451. Principles of Weed Science. 2 Hours.
PR: AGRN 202 and AGRN 203 and PLSC 206 or consent and PR or CONC: ENVP 451L. Fundamental principles of weed science including identification, ecology and control in crops. (Also listed as AGRN 451.).

ENVP 451L. Principles of Weed Science Laboratory. 1 Hour.
PR or CONC: ENVP 451. Principles of Weed Science - ENVP 451 Laboratory.

Environment, Soil and Water Science (ESWS)

ESWS 119. Soil in the City. 3 Hours.
PR: Corequisite of ESWS 119L. Study of soil as a natural resource in urban environments; influence of soils on urban development; study of environmental problems related to soils in urban land uses.

ESWS 119L. Soil in the City Laboratory. 0 Hours.
PR: Corequisite of ESWS 119. Soil in the City - ESWS 119 Laboratory.

ESWS 125L. Soil Judging Laboratory. 1 Hour.
PR: Consent. Field study of soils for classification and land use evaluation. (May be repeated for maximum of 3 credits.).

ESWS 155. Elements of Environmental Protection. 3 Hours.
An introduction to land and water resources and their management and protection. An evaluation of the relationships between human activities and natural environments and the interaction between natural resource utilization and development.

ESWS 202. Principles of Soil Science. 3 Hours.
PR: (CHEM 111 or CHEM 115) and PR or CONC: (AGRN 202L or AGRN 203 or ESWS 202L). Introductory course. Soils as a natural resource emphasizing physical, chemical, and biological properties in relation to plant growth and production, land use and management, soil and water pollution, and environmental protection. (Regional campus concurrent).

ESWS 202L. Principles of Soil Science Laboratory. 1 Hour.
PR or CONC: ESWS 202 or consent. (Regional campus concurrent.).

ESWS 224. Freshwater Field Methods. 4 Hours.
PR or CONC: (BIOL 101 or BIOL 115 or ESWS 155 or GEOL 101) and Coreq: ESWS 224L. In this course, students will study the fundamentals of freshwater systems including streams and rivers, lakes, and wetlands. Physical, chemical, biological, and ecological concepts will be addressed with a special focus on flowing systems. A variety of field methods for surveying freshwater systems will also be practiced.

ESWS 224L. Freshwater Field Methods Laboratory. 0 Hours.
PR or CONC: (BIOL 101 or BIOL 115 or ESWS 155 or GEOL 101) and Coreq: ESWS 224. In this course, students will study the fundamentals of freshwater systems including streams and rivers, lakes, and wetlands. Physical, chemical, biological, and ecological concepts will be addressed with a special focus on flowing systems. A variety of field methods for surveying freshwater systems will also be practiced.

ESWS 225L. Advanced Soil Judging Laboratory. 1 Hour.
Advanced field study for soil classification and land use evaluation. Participation in National Collegiate Soils contest required. (May be repeated for maximum of 3 credits.).

ESWS 255. Elements of Environmental Management. 3 Hours.
PR: ESWS 155. An introduction to the various regulations promulgated by the United States Environmental Protection Agency. The main goal of this course is to provide the student with a foundation of knowledge that will allow them to read and interpret environmental regulations as well as all types of regulations and codes.

ESWS 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ESWS 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

ESWS 325. Principles of Water Resources. 3 Hours.
PR: MATH 124 or higher. This course provides students an opportunity to increase their knowledge pertaining to the role(s) that water plays in human and environmental systems by examining the geographic distribution/redistribution, quantity, and quality of water resources. Students are introduced to water management evaluation policies, law and economics used to explore the decision-making challenges surrounding water resources.

ESWS 330. Soil Health. 3 Hours.
PR: (AGRN 202 or ESWS 202) and (AGRN 203 or AGRN 202L or ESWS 202L). This course will also explore the potential of, and the limitations to, the Soil Health paradigm as applied at a global scale.

ESWS 347. Wetland Environments. 3 Hours.
PR: (AGRN 202 or ESWS 202) and (AGRN 202L or AGRN 203 or ESWS 202L). Wetlands as components of natural landscapes: hydrology, geomorphology, biogeochemistry; identification and classification of wetland vegetation, soils, hydrology, and wildlife; factors important to wetland delineation and jurisdictional determination; wetland conservation, restoration, and creation.

ESWS 355. Environmental Sampling and Analysis. 3 Hours.
PR: BIOL 101 and BIOL 102 and BIOL 103 and BIOL 104 and CHEM 115 and CHEM 116. Introduction to environmental sampling methods and analysis. Lecture and hands-on experience will include sampling plan development, sample point selection, sampling equipment use, containers and preservatives, sample analysis, chain-of-custody and protective equipment.

ESWS 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ESWS 410. Soil Fertility. 3 Hours.
PR: ((ESWS 202 and ESWS 202L) or (AGRN 202 and AGRN 202L)) and (CHEM 111 or CHEM 115). Effect of soil chemical and physical properties on soil fertility; evaluation of essential and toxic nutrients and the controls on their availability; fertilizer and lime use; soil fertility evaluation.

ESWS 415. Soil Survey and Land Use. 3 Hours.
PR: (ESWS 202 and ESWS 202L) and Coreq: ESWS 415L. Identification of morphological characteristics and taxonomic units of soil; techniques of writing soil pedon and mapping unit descriptions; techniques of preparing soil maps; evaluation of soil for land use planning.

ESWS 415L. Soil Survey and Land Use Laboratory. 0 Hours.
PR: Corequisite of ESWS 415. Soil Survey and Land Use - ESWS 415 Laboratory.

ESWS 417. Soil Genesis and Classification. 4 Hours.
PR: ESWS 202 and ESWS 202L and Coreq: ESWS 417L. Origin and formation of soils; principles of soil classification; study of soil pedons and polypedons; influence of soil-forming factors and processes. (Two Saturday field trips required.).

ESWS 417L. Soil Genesis and Classification Laboratory. 0 Hours.
PR: Corequisite of ESWS 417. Soil Genesis and Classification - ESWS 417 Laboratory.

ESWS 425. Environmental Soil Management. 3 Hours.
PR: AGRN 202 and (AGRN 202L or AGRN 203) and Coreq: ESWS 425L. This course provides a foundation for utilizing creative solutions and technical knowledge in preserving and enhancing soil and water quality. Soil conservation, precision agriculture and nutrient management for protection of soil and water quality are covered. (Also listed as ENVP 425.).

ESWS 425L. Environmental Soil Management Laboratory. 0 Hours.
PR: Corequisite of ESWS 425. Environmental Soil Management - ESWS 425 Laboratory.

ESWS 430. . 3 Hours.
PR: (ESWS 202 and ESWS 202L) or (AGRN 202 and (AGRN 202L and AGRN 203) and Coreq: ESWS 430L. Physical properties of soils; water and air relationships and their influence on soil productivity.

ESWS 430L. Soil Physics Laboratory. 0 Hours.
PR: (ESWS 202 and ESWS 202L) or (AGRN 202 and 203) and Coreq: ESWS 430. Soil Physics - ESWS 430 Laboratory.

ESWS 455. Reclamation of Disturbed Soils. 3 Hours.
PR: Junior standing or above. Principles of soil science, geology, hydrology, and engineering will be applied to surface mine planning, overburden handling during mining, soil replacement and amendments, revegetation practices, acid mine drainage control and treatment, hazardous wastes, and land management of disturbed areas. (Field trip required.) (Also listed as ENVP 455.).

ESWS 460. Environmental Impact Assessment. 3 Hours.
PR: (BIOL 101 and BIOL 101L and BIOL 102 and BIOL 102L) or (BIOL 115 and BIOL 115L) and (CHEM 115 and CHEM 116) and Coreq: ESWS 460L. Application of physical, biological and social science principles to assess environmental impacts. Review and prepare environmental assessments, permits, site assessments and ecological risk assessments for environmental decision-making.

ESWS 460L. Environmental Impact Assessment Laboratory. 0 Hours.
PR: Corequisite of ESWS 460. Environmental Impact Assessment - ESWS 460 Laboratory.

ESWS 475. Environmental Water Resources. 3 Hours.
This course provides background in the physical fundamentals of water resources and interactions of land use practices, environmental water use, and water resources extraction(s) that will equip students with requisite knowledge to address complex contemporary water resources issues.

ESWS 490. . 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

ESWS 491. . 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

ESWS 495. Independent Study. 1-6 Hours.
Faculty-supervised study of topics not available through regular course offerings.

Food Science and Technology (FDST)

FDST 200. Food Science and Technology. 3 Hours.
Up-to-date basics of food science and technology, including; food industry outlook, degrees and careers, food chemistry, food processing and engineering, food microbiology and food safety, food biotechnology, and sensory evaluation of foods.

FDST 308. Food Plant Sanitation. 3 Hours.
PR: CHEM 111 or CHEM 115. Students will learn basic concepts of food processing and the laws and regulations governing it as well as good manufacturing practices involved in order to ensure the quality of food that is sold to the public.

FDST 365. Muscle Foods Technology. 3 Hours.
Emphasis on muscle of slaughtering, cutting, breaking, manufacturing, structure and composition, conversion of muscle to muscle food, processing food animals (cattle, sheep, hogs, poultry, and fish) and products to ensure quality and safety from processing through storage, fresh and value-added processing and nutritional value.

FDST 365L. Muscle Foods Technology Laboratory. 1 Hour.
PR or CONC: FDST 365. Laboratory training in the processing of carcasses derived from food animals including red meat, poultry, and fish species. Microbiology, cookery, and storage of fresh products. Basic techniques in processed muscle foods production.

FDST 445. Food Microbiology. 3 Hours.
PR: AEM 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 445L. Food Microbiology Laboratory. 1 Hour.
PR or CONC: FDST 445. Laboratory training in methods used in microbiological examination of foods. This laboratory will provide a hands-on experience for students who take or have taken FDST 445.

FDST 450. Food Chemistry. 3 Hours.
PR: CHEM 116 or HN&F 171. The course applies basic and applied scientific principles to food chemistry and practical applications. Chemical/biochemical reactions of carbohydrates, lipids, proteins, and other constituents in fresh and processed foods are discussed with respect to food quality control. Reaction conditions and processes that affect color, flavor, texture, nutrition, and safety of food are emphasized.

FDST 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

FDST 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

FDST 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

FDST 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

FDST 495. Independent Study. 1-6 Hours.
Faculty-supervised study of topics not available through regular course offerings.

FDST 496. Senior Thesis. 1-3 Hours.
PR: Consent.

FDST 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

Forestry and Natural Resource Sciences (FNRS)

FNRS 100. Forest Resources in United States History. 3 Hours.
Examines human use of forest resources in America from pre-Colombian times to present. Exploration of factors that impact the use of wood products.

FNRS 101. Careers in Natural Resources Management 1. 1 Hour.
An introduction to professional activities in forest resources management, recreation and parks management, wildlife and fisheries management, and wood science and utilization. Survey of major issues in natural resources management and conservation. (Required only for students who rank as freshman in the Division of Forestry.).

FNRS 111. Introduction to Land Reclamation. 1 Hour.
This course is designed to introduce students to the broad knowledge areas associated with land reclamation throughout central Appalachian region. Each weekly learning module will be developed by the local expert for that topic area.

FNRS 140. West Virginia's Natural Resources. 3 Hours.
Survey of policies and practices in development and use of soil, water, forest, wildlife, mineral, and human resources in West Virginia.

FNRS 150. Edible and Medicinal Plants of Appalachian Folk Medicine. 3 Hours.
Folk medicine (herbalism) is surging as people move away from industrially processed foods toward more traditional plant-based diets, have less access to medical care, or want to be more self-sufficient and learn simple preventative home remedies. This course provides a basic understanding of Appalachian folk-medicine by exploring accessible, sustainable, responsible, and safe ways of using common plants to support well-being.

FNRS 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

FNRS 203. Careers in Natural Resources Management 2. 1 Hour.
Planning a career in forestry and natural resources professions. Developing a career strategy, resume building, and conducting a successful job search.

FNRS 205. Dendrology. 2 Hours.
PR or CONC: FNRS 205L. Classification and silvical characteristics of North American forest trees.

FNRS 205L. Dendrology Laboratory. 1 Hour.
PR or CONC: FNRS 205 or FOR 205. Dendrology - FNRS 205 Laboratory.

FNRS 206L. Winter Dendrology Laboratory. 1 Hour.
PR: FOR 205 or (FNRS 205 and FNRS 205L) or equivalent. Field identification and classification of North American forest trees during leaf-off condition.

FNRS 210. Sustainable Utilization of Biomaterials. 3 Hours.
Forest ecosystems offer substantial and diverse biomaterials which can mitigate the environmental impact of their processing. This course explores how innovative bio-based solutions can shape a greener future. We examine the sustainability of forest ecosystems and renewable biomaterials, eco-friendly packaging, and energy-efficient biomaterials, urban forest utilization, and circular economy principles, explore carbon management strategies to reduce emissions and enhance sustainability.

FNRS 211. Careers and Professional Development in Sustainable Land Reclamation Management. 1 Hour.
This course introduces career pathways pertaining to land reclamation. Professional development topics are discussed to further prepare students for academic success and to advance career readiness. Course is delivered using a series of online modules.

FNRS 212. Forest Ecology. 3 Hours.
How forest ecosystems work: their role in the global ecosystem, variability of forests in space and time, forest structure and function.

FNRS 212L. Forest Ecology Laboratory. 1 Hour.
PR or CONC: FNRS 212 lecture, can be taken concurrently. Forest Ecology - FNRS 212 Laboratory. Central concepts of forest ecology are practiced through the collection, analysis, and interpretation of experimental data. Findings are communicated as an oral presentation and written report.

FNRS 222. Forest Mensuration. 4 Hours.
PR: MATH 124 or higher and Coreq: FNRS 222L. Estimating volume and growth of trees and forest stands with emphasis on the mathematical and statistical techniques involved. Laboratories include practical field experience.

FNRS 222L. Forest Mensuration Laboratory. 0 Hours.
PR: Corequisite of FNRS 222. Forest Mensuration - FNRS 222 Laboratory.

FNRS 223. Wood Anatomy and Structure. 3 Hours.
PR: Corequisite of FNRS 223L. Anatomy and structure of commercial wood species of the U.S. Survey of basic properties of wood.

FNRS 223L. Wood Anatomy and Structure Laboratory. 0 Hours.
PR: Corequisite of FNRS 223. Wood Anatomy and Structure - FNRS 223 Laboratory.

FNRS 225. Finished Wood Products. 3 Hours.
Exploration of the different materials used in low-rise residential and commercial construction applications for finishing and design aspects. Emphasis will be placed on wood products.

FNRS 232. Wood Grading and Procurement. 3 Hours.
PR: Corequisite of FNRS 232L and Forestry major or consent. Conversion and grading of raw materials in log form to primary wood products. Introduction to timber procurement systems.

FNRS 232L. Wood Grading and Procurement Laboratory. 0 Hours.
PR: Corequisite of FNRS 232. Wood Grading and Procurement - FNRS 232 Laboratory.

FNRS 240. Introduction to Computing in Natural Resources. 3 Hours.
PR: Corequisite of FNRS 240L. Introduction to computer applications in natural resource management. Emphasis on MS Excel statistical analysis tools, MS Access, Visual Basic Programming, hand held PCs and application examples.

FNRS 240L. Introduction to Computing in Natural Resources Laboratory. 0 Hours.
FNRS 240L. Introduction to Computing in Natural Resources Laboratory. PR: Corequisite of FNRS 240. Introduction to Computing in Natural Resources - FNRS 240 Laboratory.

FNRS 245. Residential Building Materials. 3 Hours.
Exploration of the different building materials used in residential and commercial construction. Emphasis will be placed on solid and engineered wood products as well as their manufacturing processes.

FNRS 251. Forest Fire Protection. 2 Hours.
Prevention, detection, and control of wildfires. Forest fuels, fire weather, and wildfire behavior. Use of fire for forest management purposes.

FNRS 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

FNRS 300. Forest Resources Management Field Practice. 6 Hours.

FNRS 301L. Forest Resources & Conservation Summer Practicum. 3 Hours.
PR: FNRS 205 and FNRS 205L and FNRS 222 and FNRS 222L. This course is designed to provide students with an in-depth, field-based learning experience. These activities generally involve significant time dedicated to one or more activities in the field, often at a distance from campus.

FNRS 310. Elements of Silviculture. 3 Hours.
PR: FNRS 205 or FOR 205. Basics of mensuration, site quality, tree and stand growth, forest structure, and development, intermediate treatments, natural disturbances and regeneration ecology, silviculture systems.

FNRS 311. Silvicultural Systems. 4 Hours.
PR: (FMAN 222 or (FNRS 222 and FNRS 222L) and (FNRS 205 and FNRS 205L) or FOR 205) and Coreq: FNRS 311L. The theory and practice of controlling forest stand establishment, composition, structure, and growth. Systems include: reproduction methods, release operations, and intermediate treatments. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

FNRS 311L. Silvicultural Systems Laboratory. 0 Hours.
PR: Corequisite of FNRS 311. Silvicultural Systems - FNRS 311 Laboratory.

FNRS 312. Projects in Sustainable Land Reclamation Management. 3 Hours.
This course will give students a practical overview of land reclamation techniques as applied in the field. During this intensive one-week summer course, students will visit various stages of land reclamation associated with extractive industries in the central Appalachian region. Students will be asked to prepare their own reclamation plans.

FNRS 315. Survey of Arboriculture. 1 Hour.
PR: (HORT 260 or FOR 205) or (HORT 260 and HORT 260L and FNRS 205 and FNRS 205L). A self-study seminar that surveys the principles and practices involved in the field of arboriculture with major emphasis on the urban landscape.

FNRS 320. Sustainable Construction. 3 Hours.
Introduction to common building practices used in residential construction with emphasis on sustainable, green construction.

FNRS 322. Advanced Forest Measurements. 3 Hours.
PR: FMAN 222 or (FNRS 222 and FNRS 222L) or equivalent. Measurement and computer simulation of forest growth; principles of growth and yield; statistical methods applied to forest measurement problems.

FNRS 326. Remote Sensing of Environment. 3 Hours.
PR: (MATH 126A or MATH 126B or MATH 126C) and MATH 128. Measurement and interpretation of natural resources and environment from photography and radar, infrared, and microwave imagery.

FNRS 330. Principles of Forestry Economics. 4 Hours.
PR: (ARE 150 or ECON 201) and Coreq: FNRS 330L. Production, distribution and use of forest goods and services. Emphasis on methods and problem solving techniques in the economic aspects of forestry.

FNRS 330L. Principles of Forestry Economics Laboratory. 0 Hours.
PR: Corequisite of FNRS 330. Principles of Forestry Economics - FNRS 330 Laboratory.

FNRS 333. Wood Machining. 3 Hours.
Introduction to basic concepts of wood machining with emphasis on production equipment and furniture manufacturing. Special topics of wood joining techniques and methods. Analysis of operational safety, health hazards and accident prevention. (Fall of even years.).

FNRS 335. 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 337. Wood Adhesion and Finishing. 3 Hours.
PR: Corequisite of FNRS 337L and Wood Industry major or consent. Fundamentals of the bonding and finishing of wood including preparation, processing, and evaluation of adhesive and finishing systems.

FNRS 337L. Wood Adhesion and Finishing Laboratory. 0 Hours.
PR: Corequisite of FNRS 337. Wood Adhesion and Finishing - FNRS 337 Laboratory.

FNRS 340. Physical Properties of Wood. 3 Hours.
PR: (FNRS 223 and FNRS 223L) or WDSC 223) and Coreq: FNRS 340L. Specific gravity and density of wood; relationships between wood and liquids and applications in wood seasoning; thermal electrical and acoustical properties.

FNRS 340L. Physical Properties of Wood Laboratory. 0 Hours.
PR: Corequisite of FNRS 340. Physical Properties of Wood - FNRS 340 Laboratory.

FNRS 341. Wood Mechanics. 3 Hours.
PR: MATH 124 or higher and PHYS 101 and Coreq: FNRS 341L and Wood Science major or consent. Introduction to static properties of selections, elementary mechanics of deformable bodies, axial loading, column and beam analysis, and design considerations.

FNRS 341L. Wood Mechanics Laboratory. 0 Hours.
PR: Corequisite of FNRS 341. Wood Mechanics - FNRS 341 Laboratory.

FNRS 342. Natural Resource Entrepreneurship. 3 Hours.
Principles of small business start-up, organization, marketing, finance, and management with an emphasis on natural resource-based enterprises.

FNRS 344. River Conservation & Management. 3 Hours.
Synthesis of hydrological processes and concepts of river and watershed conservation and management. Course emphasizes hydrology, climatology, and ecology processes and principles of watershed management to obtain river and water resources sustainability.

FNRS 344S. River Conservation and Management. 0 Hours.
Synthesis of hydrological processes and concepts of river and watershed conservation and management. Course emphasizes hydrology, climatology, and ecology processes and principles of watershed management to obtain river and water resources sustainability.

FNRS 351. Forest Products Protection. 3 Hours.
PR: Corequisite of FNRS 351L. Biological organisms responsible for deterioration of wood products, their control by preservative methods, and study of fire retarding methods.

FNRS 351L. Forest Products Protection Laboratory. 0 Hours.
PR: Corequisite of FNRS 351. Forest Products Protection - FNRS 351 Laboratory.

FNRS 355. Arboriculture-Urban Tree Care. 3 Hours.
Students will learn how to promote a sustainable landscape by managing urban tree health through proper selection, planting, and pruning of trees.

FNRS 362. Decision Making and Quality Management. 3 Hours.
PR: MATH 124 and STAT 211 and Coreq: FNRS 362L. Effective decision-making and quality management are essential for organizational success in today's competitive environment. This comprehensive course equips students with the tools and techniques to analyze complex scenarios, optimize resources, and implement world-class quality systems. This course integrates analytical techniques with real-world applications, preparing students for leadership roles in decision-making and quality management across industries.

FNRS 362L. Forest Product Decision-Making Laboratory. 0 Hours.
PR: Corequisite of FNRS 362. Laboratory course for FNRS 362.

FNRS 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

FNRS 400. Forest Resources Management Field Practice. 6 Hours.
PR: CE 200 and (FMAN 322 or (FNRS 322 and FNRS 322L). Application and study of forest management practices with emphasis on field problems, including a one-week trip to observe forestry outside the Appalachian hardwood region. (Course will be taught during five consecutive six-day weeks.).

FNRS 401. Wood Industries Field Trip. 1 Hour.
A one-week trip to observe manufacturing methods and techniques of commercial wood industry plants. Plants visited include furniture, plywood, veneer, hardboard, pulp and paper, sawmilling, and preservation.

FNRS 402. Forest Measurement Field Practice. 3 Hours.
PR: CE 200 and (FNRS 205 and FNRS 205L) or FOR 205) and (FMAN 322 or FNRS 322) and CE 200 and must be a Wood Industry major. Application of surveying and mensurational practices with emphasis on field problems.

FNRS 411. Sugarbush Management and Maple Syrup Production. 3 Hours.
PR: Corequisite of FNRS 411L. Introduces students to modern maple syrup production. Students will participate in all aspects of the WVU maple syrup operation, from sap collection to making finished syrup. Students will also perform an end of year financial assessment.

FNRS 411L. Sugarbush Management and Maple Syrup Production Laboratory. 0 Hours.
FNRS 411L. Sugarbush Management and Maple Syrup Production Laboratory. PR: Corequisite of FNRS 411. Sugarbush Management and Maple Syrup Production - FNRS 411 Laboratory.

FNRS 413. Wood Chemistry. 3 Hours.
PR: Corequisite of FNRS 413L and Wood Science major or consent. Chemical composition of wood including cellulose, hemicellulose, and extractives. Chemical processing of wood.

FNRS 413L. Wood Chemistry Laboratory. 0 Hours.
PR: Corequisite of FNRS 413. Wood Chemistry - FNRS 413 Laboratory.

FNRS 415. Regional Silviculture. 3 Hours.
PR: FMAN 212 or (FNRS 212 and FNRS 211L) and PR or CONC: FMAN 311 or FNRS 310 or (FNRS 311 and FNRS 311L) or FOR 310 and Forestry major or consent. Major forest types of the United States; their composition, management, problems, and silvicultural treatment.

FNRS 420. Forest Roads. 4 Hours.
PR: CE 200 and CS 101. A study of techniques and methods of design, layout and construction details of various standards of forest roads.

FNRS 421. Renewable Resources Policy and Governance. 3 Hours.
PR: Consent. Forest, wildlife, fisheries, and recreation resource policies of world, with an emphasis on the U.S.: important federal and state laws; governance of public and private lands and renewable natural resources. (Crosslisted with WMAN 421.).

FNRS 422. Harvesting Forest Products. 3 Hours.
PR: Corequisite of FNRS 422L. Analysis of ground-based and cable harvesting systems, including time and motion studies, productivity and cost analysis, occupational safety and health, environmental issues, equipment evaluation and selection, and trucking of forest products.

FNRS 422L. Harvesting Forest Products Laboratory. 0 Hours.
PR: Corequisite of FNRS 422. Harvesting Forest Products - FNRS 422 Laboratory.

FNRS 423. Sustainable Urban Forests. 3 Hours.
PR: Must be a junior or senior status to take this class. 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 424. Vegetation of West Virginia. 2 Hours.
PR: FNRS 205 and FNRS 205L with a minimum grade of C-. 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. (Summer, off campus.).

FNRS 424L. Vegetation of West Virginia Laboratory. 1 Hour.
PR: FNRS 205 and FNRS 205L with a minimum grade of C- and PR or CONC: FNRS 424. Vegetation of West Virginia - FNRS 424 Laboratory.

FNRS 425. Global Forest Resources. 3 Hours.
Significance of renewable natural resources on a global scale and the ecological, economic, and social contexts in which they are managed. Emphasis is on world forest resources, including timber, wildlife, and social uses.

FNRS 426. Global Forest Resources Practicum. 3 Hours.
PR: Consent. An intensive field practicum abroad provides students with experiential learning opportunities of global approaches to forest management, and imparts the historical context necessary for an appreciation of cultural diversity.

FNRS 430. Forest Environmental Conservation. 3 Hours.
PR: FNRS 344. This course will cover land use history, disturbance events and pressures driving change to forest resources. We focus on regional efforts to restore, enhance, and maintain forest ecosystem services. We will utilize a combination of lecture, guest presentations, student-led discussions, and field activities with conservation organizations to provide students with tools and application in practice in the conservation profession.

FNRS 433. Forest Management. 3 Hours.
PR: (FMAN 400 or FNRS 400) and (FMAN 311 or (FNRS 311 and FNRS 311L) and (FMAN 330 or (FNRS 330 and FNRS 330L). Principles of sustained yield forest management: organization of forest areas, selection of management objectives, application of silvicultural systems, and regulation of cut. Principles of sustainable forestry and ecosystem management.

FNRS 434. Forest Resources Management Planning. 3 Hours.
PR: Corequisite of FNRS 434S. Integrated planning of long-term management of forest resources. Development of a management plan for an actual forest tract. Emphasis on biological, social, economic and ethical considerations in decision-making.

FNRS 434S. Forest Resources Management Planning Studio. 0 Hours.
PR: Corequisite of FNRS 434. Forest Resources Management Planning Studio.

FNRS 435. Applied Environmental Justice. 3 Hours.
This project-driven, problem-based course explores the foundational concepts and historical development of environmental and climate justice frameworks. Students will examine their real-world application to communities across the United States, engaging with key issues such as flooding, pollution, land use, and adaptation.

FNRS 438. Human Dimensions Natural Resource Management. 3 Hours.
This class is designed to provide junior-and-senior level forestry and natural resource management majors with a repertoire of social and communication knowledge and skills such as public facilitation, public participation, social impact assessment, conflict management, and collaborative planning techniques.

FNRS 440. Forestry Consulting. 3 Hours.
PR: (FMAN 311 or (FNRS 311 and FNRS 311L) and (FMAN 330 or (FNRS 330 and FNRS 330L) or consent. The application of forest management principals and business concepts to the consulting forestry profession. Topics include: natural resource inventories, timberland appraisals, timber sale administration, and forest management planning.

FNRS 445. Bio-based Energy Systems. 3 Hours.
Introduction to biomass feedstock production for bioenergy application, preprocessing and characterization, biofuel conversion technologies, economic and environmental impacts, and greenhouse gas emissions.

FNRS 450. Forest Valuation and Investment. 3 Hours.
PR: FMAN 330 or (FNRS 330 and FNRS 330L). Asset valuation concepts, with special emphasis on forests. Financial analyses of forest operations. Concepts and strategies in forestland investment and portfolio management.

FNRS 454. Field Watershed Hydrology. 3 Hours.
PR: FHYD 444 or FNRS 444. A quantitative understanding of measurement theory, field techniques, instrumentation, and data analysis including technical computational programming used to study hydrologic systems including climate, streams, riparian areas, hill slopes, shallow groundwater, and watersheds.

FNRS 460. Plant Layout for Wood Industries. 3 Hours.
PR: Senior standing. Relates knowledge of wood product processes to optimize production. Study of proper arrangement of machines, and work and storage areas.

FNRS 465. Wood-Based Composite Materials. 3 Hours.
PR: (FNRS 341 and FNRS 341L) or WDSC 341) and Coreq: FNRS 465L. Fundamentals of manufacturing wood-based composite materials, including processing, products, evaluation, and applications in the marketplace.

FNRS 465L. Wood-Based Composite Materials Laboratory. 0 Hours.
PR: Corequisite of FNRS 465. Wood-Based Composite Materials - FNRS 465 Laboratory.

FNRS 470. Problems in Forestry, Wood Science, Wildlife, or Recreation. 1-4 Hours.
PR: Forestry senior or consent.

FNRS 475. Marketing Forest Products. 3 Hours.
This course will examine techniques used by the forest products industry to market commodity, value-added specialty, and sustainable (i.e., green) products.

FNRS 480. Senior Projects 1. 2 Hours.
Senior project requires students to identify manwood science related problem, perform a literature review, and develop a plan for research to be completed in FNRS 481 or WDSC 481.

FNRS 481. Senior Projects 2. 2 Hours.
PR: FNRS 480 or WDSC 480. Senior project requires students to use knowledge from other courses to conduct research proposed in FNRS 480 or WDSC 480 and analyze results and prepare a technical report.

FNRS 485. Environmental Water Resources. 3 Hours.
This course provides background in the physical fundamentals of water resources and interactions of land use practices, environmental water use, and water resources extraction(s) that will equip students with requisite knowledge to address complex contemporary water resources issues.

FNRS 488. Forest Strategic Planning. 3 Hours.
PR: FNRS 362 or FNRS 430 or FNRS 433. This Capstone course covers the principles associated with managing forests for sustained yield, products classification and development, and maintenance and valuation of ecosystems and their services.

FNRS 491. Professional Field Experience. 1-18 Hours.
PR: Consent (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

FNRS 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

FNRS 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

FNRS 496. Senior Thesis. 1-3 Hours.
PR: Consent.

Forestry (FOR)

FOR 470A. Problems in Forestry, Wood Science, Wildlife, or Recreation. 1-4 Hours.
PR: Forestry senior or consent.

Genetics (GEN)

GEN 101. Beginner's Guide-Genetics. 3 Hours.
General introduction to concepts in genetics for nonmajors, examining the role of molecules, genes and chromosomes on inheritance, aging, disease, and gender. Case studies show application to agriculture, ecological/environmental issues, medicine, and forensics.

GEN 120. Genetics and Society. 3 Hours.
Origin of life, selection, mutation, eugenics, genetic engineering, genetics and evolution, genetics and medicine, genetics and politics, decision making, social, and ethical issues in human genetics. For students interested in heredity and heritage.

GEN 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

GEN 286. Computational Genetics. 2 Hours.
PR: GEN 101 or BIOL 115 with a minimum grade of C-. Development of computational and bioinformatics skills used in academic, biotech, and pharmaceutical laboratories to analyze and interpret genetic data.

GEN 330. Conservation Genetics. 3 Hours.
PR: BIOL 101 and BIOL 102 or equivalent or higher and MATH 124 or higher. Introduction to the principles of modern genetics needed to understand and manage important challenges in conservation of biodiversity including game, non-game, and endangered/threatened species. Also listed as WMAN 330.

GEN 371. Principles of Genetics. 4 Hours.
PR: (BIOL 101 and BIOL 101L and BIOL 102 and BIOL 102L) or (BIOL 115 and BIOL 117) or BIOL 219 and Coreq: GEN 371L. The fundamentals of inheritance.

GEN 371L. Principles of Genetics Laboratory. 0 Hours.
PR: Corequisite of GEN 371. Principles of Genetics - GEN 371 Laboratory.

GEN 440. Genetic Engineering Technologies. 3 Hours.
PR: GEN 101 or BIOL 115. This course presents agricultural technologies produced by genetic engineering (GE) are available to consumers in the global marketplace and teaches the genetic concepts and manipulations that were used for their production.

GEN 450. Applied Developmental Genetics. 3 Hours.
PR: GEN 101 or BIOL 115. Exploration of current topics in applied developmental genetics through the use of case studies and investigation of underlying concepts that lay at the basis of applied genetics.

GEN 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

GEN 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

GEN 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

GEN 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

GEN 496. Senior Thesis. 1-3 Hours.
PR: Consent.

GEN 497. Research. 1-6 Hours.
Independent research projects.

GEN 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Human Nutrition and Foods (HN&F)

HN&F 126. Society and Food. 3 Hours.
Exploration on a global basis of interactions of man and environment as reflected in food production systems. Relation of food supply and use in development or maintenance of social and political institutions.

HN&F 171. Introduction to Human Nutrition. 3 Hours.
Nutrient structure, metabolism, integrated function and their importance to human well-being during all stages of the life cycle. Current concerns and those of special interest to college students in meeting nutrient needs.

HN&F 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

HN&F 200. Nutrition/Activity/Health. 3 Hours.
PR: HN&F 171. An overview of how proper nutrition and physical activity relates to individual health and disease prevention.

HN&F 201. Professional Development in Dietetics. 3 Hours.
Introduction to the profession of dietetics with emphasis on competencies, preparation for, and responsibilities associated with the profession.

HN&F 250. Cross-Cultural Cuisine. 3 Hours.
PR: Corequisite of HN&F 250L. This course examines the evolution of human society and culture from a historical perspective as it relates to food and cuisine. Economic and religious influences on dietary patterns and nutritional health are also explored.

HN&F 250L. Cross-Cultural Cuisine Laboratory. 0 Hours.
PR: Corequisite of HN&F 250. Cross-Cultural Cuisine - HN&F 250 Laboratory.

HN&F 271. Fundamentals of Nutrition. 3 Hours.
PR:HN&F 171. The occurrence, uptake and metabolic roles of essential and key non-essential nutrients will be discussed in relation to growth, reproduction, and health in human subjects.

HN&F 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

HN&F 298. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

HN&F 348. Science of Food Preparation. 3 Hours.
PR: (BIOL 101 or BIOL 115) and CHEM 115 and Coreq: HN&F 348L. To explore functional properties of ingredients and applied scientific theories to food preparation.

HN&F 348L. Science of Food Preparation Laboratory. 0 Hours.
PR: (BIOL 101 or BIOL 115) and CHEM 115 and Coreq: HN&F 348. To explore functional properties of ingredients and applied scientific theories to food preparation.

HN&F 353. Food Service Systems Management. 3 Hours.
PR: HN&F 171 and (HN&F 350 or MATH 124 or higher) and Coreq: HN&F 353L. Introduction to food service systems and systems management. Principles of quantity food production management: production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications.

HN&F 353L. Food Service Systems Management Laboratory. 0 Hours.
Coreq: HN&F 353. Food Service Systems Management - HN&F 353 Laboratory.

HN&F 355. Nutritional Assessment. 3 Hours.
PR: HN&F 271. This course will provide students with the knowledge needed to interpret nutrition-related lab values and anthropometric data, identify how nutrition is related to disease prevention, understand clinical and biochemical assessments of nutritional status and how nutritional assessment can be applied in dietetics practices.

HN&F 364. Nutrition Education & Counseling. 3 Hours.
PR: HN&F 271. Roles, responsibilities, and limitations of the professional health/nutrition educator in nutrition counseling, guidance and referral, nutrition needs assessment, dynamics of nutrition counseling interaction, and selected counseling techniques.

HN&F 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

HN&F 401. Senior Seminar in Nutrition. 2 Hours.
The course provides an integrative approach to various topics related to the practice of dietetics by challenging students to read, critique/evaluate, present, and discuss current research.

HN&F 450. Study Abroad: Food and Culture. 1-6 Hours.
This course examines how food behaviors are shaped by culture, and critically analyzes the multiple relationships between food, culture, and globalization. Students will gain firsthand experience of a culture separate from their own through observations and interactions with the people. Students will be actively involved in the study abroad experience through excursions of various cultural, ecological and archeological importance.

HN&F 460. Advanced Nutrition. 3 Hours.
PR: HN&F 271 and (AGBI 410 or BIOC 339). Role of nutrients in physiological and biochemical processes and metabolism in the body. Biochemical foundations of RDA and clinical nutrition.

HN&F 472. Community Nutrition. 3 Hours.
PR: HN&F 171. Beginning planning for community nutrition to individuals and families at various stages of the life cycle. Roles of concerned agencies and professional groups. Clinical experience in community facilities.

HN&F 473. Medical Nutrition Therapy 1. 3 Hours.
PR: HN&F 171 or consent. Nutrient analysis and introduction to nutrition experimentation; nutritional assessment.

HN&F 474. Medical Nutrition Therapy 2. 3 Hours.
PR: HN&F 473 and (PSIO 241 or PSIO 441 or ANPH 301) or consent. Nutritional care aspects of patients. Modification of diet to meet human nutrition needs in various medical conditions.

HN&F 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

HN&F 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

HN&F 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

HN&F 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

HN&F 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

HN&F 496. Senior Thesis. 1-3 Hours.
PR: Consent.

HN&F 497. Research. 1-15 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 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Horticulture (HORT)

HORT 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

HORT 220. General Horticulture. 3 Hours.
PR: BIOL 101 and (BIOL 101L or BIOL 103) or consent and Coreq: HORT 220L. Principles underlying present-day horticulture practice with special emphasis on how basic discoveries in plant science have been applied in horticulture.

HORT 220L. General Horticulture Laboratory. 0 Hours.
Coreq: HORT 220. General Horticulture - HORT 220 Laboratory.

HORT 251. Floral Design. 3 Hours.
Basic course in flower arrangement to cover occasions for the home and retail flower shop.

HORT 260L. Woody Plant Materials Laboratory. 3 Hours.
Common ornamental woody plants, their identification, cultural needs, and evaluation of use; some outdoor study and a one-day nursery trip.

HORT 262. Herbaceous Plant Materials. 3 Hours.
PR: Corequisite of HORT 262L. Identification, description, adaptability, and evaluation of selected herbaceous annuals and perennials with emphasis on their use as design elements.

HORT 262L. Herbaceous Plant Materials Laboratory. 0 Hours.
Coreq: HORT 262. Herbaceous Plant Materials - HORT 262 Laboratory.

HORT 293. Special Topics. 6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

HORT 298. Honors. 1-3 Hours.
Independent reading, study, or research.

HORT 310. Vines to Wines. 3 Hours.
PR: Corequisite of HORT 310L. Introduction and overview of the principles underlying present-day grape and wine production with special emphasis on origins, botany, appreciation, historical and cultural significance.

HORT 310L. Vines to Wines Laboratory. 0 Hours.
PR: Corequisite of HORT 310. Laboratory for HORT 310.

HORT 315. Seed to Weed: Unpotting the Plant. 3 Hours.
This course encourages discussion and discourse on the cultivation and uses of cannabis by exposing students to the history, laws and regulation, health effects, environmental issues, growing and marketing of cannabis and cannabis products.

HORT 330. Plant Propagation. 3 Hours.
PR: (PLSC 206 or consent) and Coreq: HORT 330L. Study of practices of plant propagation and factors involved in reproduction in plants.

HORT 330L. Plant Propagation Laboratory. 0 Hours.
Coreq: HORT 330. Plant Propagation - HORT 330 Laboratory.

HORT 360. Landscape Management. 3 Hours.
PR: (HORT 220 and HORT 260 and HORT 262 and Coreq: HORT 360L) or consent. Introduction to basic landscape management principles and practices including landscape design, installation and maintenance.

HORT 360L. Landscape Management Laboratory. 0 Hours.
PR: HORT 220 and HORT 260 and HORT 262 and Coreq: HORT 360. Laboratory for HORT 360.

HORT 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

HORT 441. Garden Center Management. 3 Hours.
PR: PLSC 206 and HORT 220 or consent. Principles of the operation and management of nursery, garden center, and landscape installation businesses with an emphasis on current issues.

HORT 443. Fruit & Vegetable Crops. 3 Hours.
PR: Corequisite of HORT 443L. Botanical and ecological characteristics influencing the production of fruit and vegetable crops. Course emphasis is on traditional and contemporary commercial production methods.

HORT 443L. Vegetable Crops Laboratory. 0 Hours.
PR: Corequisite of HORT 443. Fruit & Vegetable Crops - HORT 443 Laboratory.

HORT 444. Handling and Storage of Horticultural Crops. 3 Hours.
PR: PLSC 206 and Coreq: HORT 444L. Characteristics of perishable crops. Methods and materials used to maintain quality.

HORT 444L. Handling and Storage of Horticultural Crops Laboratory. 0 Hours.
Coreq: HORT 444. Handling and Storage of Horticultural Crops - HORT 444 Laboratory.

HORT 445. Greenhouse Management. 3 Hours.
PR: HORT 220 with a minimum grade of C- and Coreq: HORT 445L. Greenhouse as a controlled plant environment. How to regulate factors influencing plant growth and development within specialized environments of greenhouses.

HORT 445L. Greenhouse Management Laboratory. 0 Hours.
Coreq: HORT 445. Greenhouse Management - HORT 445 Laboratory.

HORT 480. Case Studies in Horticulture. 3 Hours.
PR: Consent. Capstone course for the horticulture major. The main goal of the course is to develop independent thinkers and professionals in the field of horticulture. The course emphasizes data and information gathering, vetting of sources and resources used in problem solving, and the formation of concise and logical arguments to help analyze and solve from simple to complex problems.

HORT 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

HORT 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

HORT 493. Special Topics. 6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

HORT 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

HORT 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

HORT 496. Senior Thesis. 1-3 Hours.
PR: Consent.

HORT 497. Research. 1-6 Hours.
Independent research projects.

HORT 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Landscape Architecture (LARC)

LARC 105. Introduction to Landscape Architecture, Environmental Design and Planning. 3 Hours.
A general overview of the field of landscape architecture, environmental design and planning. The course reviews the practices of design and planning professionals and their connections to society. An emphasis is placed on past development traditions and current sustainable development methods, strategies, and impacts of planning and design through the review of past and current projects.

LARC 120S. Landscape Architectural Drawing Studio. 3 Hours.
PR: Landscape Architecture majors only. Introduction to elements of visual techniques in drafting, basic design, and environmental systems.

LARC 121S. Landscape Architectural Graphics Studio. 3 Hours.
Introduction to design and graphic methodology with applications to current standards. Development of principles of communication in two- and three-dimensional visual thinking applicable to environmental design professions. (Two 3-hr. studios.).

LARC 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

LARC 212. History of Landscape Architecture. 3 Hours.
A broad survey of the history of the designed human environment with emphasis on the development of landscape architecture. (Does not fulfill Cluster A for landscape architecture students.).

LARC 220. Landscape Field Drawing. 3 Hours.
PR: LARC 121 with a minimum grade of C- or consent. Outdoor sketching and drawing as a tool for field observation and to communicate landscape design ideas. Students sample a range of media and techniques, then focus and develop their individual drawing style. Offered in Fall. (1.5-hr lecture, 3-hr studio).

LARC 223. Computer Graphics in Landscape Architecture. 3 Hours.
PR: LARC 121. Application of basic computer graphics to include drafting, rendering, and visualization software used in developing landscape architectural plans and environment analysis. (Two 3-hr. studios.).

LARC 224. Digital Design Graphics for Landscape Architecture. 2 Hours.
This course is designed to provide students with a working knowledge of how to generate and manipulate graphic images digitally. Over the course of the semester, we will cover the basics of the three most common Adobe Creative Cloud programs used by landscape architects: Photoshop, Illustrator, InDesign and Acrobat.

LARC 229. Landscape Architecture. 3 Hours.
PR: For non- landscape architecture majors only. An appreciation of the basic principles of planting design and information pertaining to the use of ornamental plants around the home. (2 hr. lec., one 2-hr. studio.).

LARC 231. Landscape Construction Materials and Methods. 3 Hours.
PR: LARC 250. A study of materials used in landscape architectural construction with emphasis on methods of construction and the preparation of construction drawings for design implementation. (2 hr. lec., one 2-hr. studio.).

LARC 250S. Theory of Landscape Architectural Design Studio. 3 Hours.
PR: LARC 121 or LARC 121S. Application of elements and principles of art and design to landscape architecture.

LARC 251. Landscape Architectural Design. 1 Hour.
PR: LARC 250 or equivalent and PR or CONC: LARC 251S. Investigation and application of various factors which play a role in the design of natural and man-made environment.

LARC 251S. Landscape Architectural Design Studio. 2 Hours.
PR or CONC: LARC 251. Landscape Architectural Design Studio.

LARC 260. Ornamental Woody Plants and Groundcovers. 3 Hours.
PR: BIOL 101 and BIOL 103 or equiv. Design uses, ornamental qualities, cultural requirements and identification of woody plants and groundcovers in West Virginia. Field course. (One day field trip required at student's expense). (Two 3-hr. studios.).

LARC 261. Planting Design. 1 Hour.
PR: LARC 250 and LARC 260 and PR or CONC: LARC 261S. Study of planting design theory and practice, including uses of plants in site and environmental design, planting design techniques and preparation of planting plans, construction details, and technical specifications.

LARC 261S. Planting Design Studio. 2 Hours.
PR or CONC: LARC 261. Planting Design Studio.

LARC 271. Portfolio Design. 1 Hour.
PR: LARC 121 and LARC 250 and LARC 260. Introduction to graphic design and presentation formals and their application for the preparation of the second year portfolio. (One 2-hr. studio.).

LARC 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

LARC 330S. Landscape Architectural Construction 1 Studio. 4 Hours.
PR: LARC 231 and LARC 251S and MATH 124 or higher. The study of the technical principles of grading design, their application to site planning, and preparation of land form grading plans.

LARC 331. Advanced Grading & Stormwater. 1 Hour.
PR: LARC 330 with a minimum grade of C- and PR or CONC: LARC 331S. Study and preparation of parkway plans (road alignment), surface and sub-surface drainage plans, advanced grading plans, and cost estimates.

LARC 331S. Advanced Grading & Stormwater Studio. 3 Hours.
PR or CONC: LARC 331. Advanced Grading & Stormwater Studio.

LARC 332. 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 undergraduate course, cross listed with LARC 532 (for graduate students).

LARC 334. 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 undergraduate course, cross listed with LARC 534 (for graduate students).

LARC 350. Landscape Architectural Design 2. 1 Hour.
PR or CONC: LARC 350S. Study of medium scale site design with emphasis on site analysis, design methodology and presentation.

LARC 350S. Landscape Architectural Design 2 Studio. 3 Hours.
PR or CONC: LARC 350. Landscape Architectural Design 2 Studio.

LARC 351. Landscape Architectural Design 3. 1 Hour.
PR or CONC: LARC 351S. Site-design problems dealing with complex environmental systems emphasizing rural and urban design. Projects are integrated with landscape architectural construction.

LARC 351S. Landscape Architectural Design 3 Studio. 3 Hours.
PR or CONC: LARC 351. Landscape Architectural Design 3 Studio.

LARC 360. Natural Systems Design. 1 Hour.
PR or CONC: LARC 360S. Study of native and naturalized plants of this region and their ecological tolerances, importance to site analysis, and use in planting design. (2-day field trip required at student's expense.).

LARC 360S. Natural Systems Design Studio. 3 Hours.
PR or CONC: LARC 360. Natural Systems Design Studio.

LARC 361. Interior Plantscaping. 2 Hours.
PR: BIOL 101 and BIOL 103 or PLSC 206. The study of plants appropriate to interior plantscaping and their special needs and uses in design situations. (One day field trip required at student's expense.) (1 hr. lec., one 3 hr. studio.).

LARC 423. Advanced CAD. 2 Hours.
PR: LARC 223 or equivalent. Study and application of advanced computer techniques including Land Development Desktop and AutoCAD. (Two 2 hr. studios.).

LARC 435. Sustainable Trails: Design Detailing & Drainage. 3 Hours.
PR: LARC 334 or (LARC 231 and LARC 331 and LARC 360) with a minimum grade of C- in all. 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 undergraduate course, cross listed with LARC 535 (for graduate students).

LARC 437. Sustainable Trails: Practicum Experience. 1-3 Hours.
PR: (LARC 435 and RPTR 436) with a minimum grade of C-. 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, undergraduate course, cross listed with LARC 537 (for graduate students).

LARC 444. Western European Gardens, Landscapes and Architecture: Field Study. 6 Hours.
This is a travel course that includes visits to Belgium, France, Netherlands and Germany and focuses on a variety of environments- urban, agricultural/rural, and natural. Major cities in the travel experience may include Brussels, Paris, and Amsterdam. The core work of the course consists of a journal/sketchbook. (Also listed as PLSC 444.).

LARC 448. Design Analysis. 2 Hours.
PR: Consent. Analysis of planning and design projects to offer solutions to a given problem.

LARC 450. Advanced Landscape Architectural Design 1. 1 Hour.
PR: LARC 331 and LARC 351 and LARC 360 and PR or CONC: LARC 450S. Comprehensive design problems integrating all aspects of site design, planting design and construction. Includes advanced projects for urban and rural sites.

LARC 450S. Advanced Landscape Architectural Design 1 Studio. 4 Hours.
PR or CONC: LARC 450. Advanced Landscape Architectural Design 1 Studio.

LARC 451. Advanced Landscape Architectural Design 2. 1 Hour.
PR: LARC 450 and PR or CONC: LARC 451S. A comprehensive problem in landscape architecture in which the student demonstrates proficiency acquired from their program of study.

LARC 451S. Advanced Landscape Architectural Design 2 Studio. 4 Hours.
PR or CONC: LARC 451. Advanced Landscape Architectural Design 2 Studio.

LARC 452. Contemporary Issues in Landscape Architecture. 3 Hours.
PR: LARC 250 and PR or CONC: LARC 251. A series of seminar discussions exploring current and future trends in the practice of landscape architectural design, planning, and management.

LARC 464. Designing Healthy Places. 3 Hours.
Examination and analysis of environmental design solutions that have positive impacts for individual and community health outcomes.

LARC 465. Regional Design. 3 Hours.
PR: Consent. Consideration of regional landscapes in order to effectively relate design to the ecology and development of a region.

LARC 466. Introduction to Urban Design Issues. 3 Hours.
PR: Consent. Community analysis methods, city and small town planning and management of community growth. The course focus is on understanding community and urban design issues and growth management. (Offered in fall of odd years.).

LARC 484. Professional Practice. 3 Hours.
PR: Consent. Procedures in preparation of contract documents, fees, estimates, operation of an office, and relationship to clients and contractors. (3 hr. lec.).

LARC 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

LARC 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

LARC 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

LARC 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of mutual concern to students and faculty.

LARC 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

LARC 496. Senior Thesis. 1-3 Hours.
PR: Consent.

LARC 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Plant Science (PLSC)

PLSC 105. Plants and People: Past and Present. 3 Hours.
A course focused on exploring the interaction between plants and humans, and the impact plants have had, and have on human society.

PLSC 140. Sustainable Living. 3 Hours.
Explores the personal, social, economic, and environmental aspects of making sustainable choices. Sustainability principles and practices are discussed along with assessments of consumption and lifestyle decisions. Also listed as DSGN 140 and RESM 140.

PLSC 206. Principles of Plant Science. 4 Hours.
PR: Corequisite of PLSC 206L. Anatomy, morphology, and physiology of higher plants. Study of growth and development of economically important plants, their culture, and products.

PLSC 206L. Principles of Plant Science Laboratory. 0 Hours.
PR: Corequisite of PLSC 206. Principles of Plant Science - PLSC 206 Laboratory.

PLSC 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

PLSC 444. Western European Gardens, Landscapes and Architecture. 6 Hours.
This is a travel course that includes visits to Belgium, France, Netherlands and Germany and focuses on a variety of environments- urban, agricultural/rural, and natural. Major cities in the travel experience may include Brussels, Paris, and Amsterdam. The core work of the course consists of a journal/sketchbook. (Also listed as LARC 444.).

PLSC 453. 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. The National Organic Rule, farm certification, crop/livestock systems and international organic production. (Students may not receive credit for both PLSC 453 and PLSC 553).

PLSC 460. 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 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

PLSC 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

PLSC 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

PLSC 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

PLSC 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

PLSC 496. Senior Thesis. 1-3 Hours.
PR: Consent.

PLSC 497. Research. 1-6 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

PLSC 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

PLSC 499. Global Service Learning. 1-3 Hours.
PR: Consent. Theory and practice of global service learning. The main objective will be to pair the experiential aspects of meaningful and sustained service in the host community with work from the student's anchor course by offering a methodological framework for cultural immersion and community service as well as adding to the content of the anchor course.

Plant Pathology (PPTH)

PPTH 401. General Plant Pathology. 3 Hours.
PR or CONC: PPTH 401L. Nature and causes of plant diseases; methods of control.

PPTH 401L. General Plant Pathology Laboratory. 1 Hour.
PR or CONC: PPTH 401. General Plant Pathology - PPTH 401 Laboratory.

PPTH 403. Mycology. 3 Hours.
PR: (CHEM 111 or CHEM 115) and (BIOL 101 or BIOL 115). An introduction to the biology, ecology, and classification of fungi and their impacts on human affairs.

PPTH 409. Nematology. 3 Hours.
PR: Corequisite of PPTH 409L. Nematode biology, ecology, taxonomy, and control, with particular emphasis on plant parasitic forms.

PPTH 409L. Nematology Laboratory. 0 Hours.
Coreq: PPTH 409. Nematology - PPTH 409 Laboratory.

PPTH 470. Forest Pest Management. 3 Hours.
PR or CONC: PPTH 470L. Relationship of insects and disease organisms to the forest ecosystem; recognition of agents that affect forest health; management strategies for regulating their damage. (Also listed as ENTO 470.).

PPTH 470L. Forest Pest Management Laboratory. 1 Hour.
PR or CONC: PPTH 470. Forest Pest Management - PPTH 470 Laboratory.

PPTH 471. Urban Tree and Shrub Health. 1 Hour.
PR: PPTH 470 or ENTO 470 or PPTH 401 and ENTO 404. The unique problems associated with managing trees and woody shrubs in an urban environment will be observed and discussed; management options will be evaluated. (Also listed as ENTO 471).

PPTH 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

PPTH 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

PPTH 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

PPTH 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

PPTH 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

PPTH 496. Senior Thesis. 1-3 Hours.
PR: Consent.

PPTH 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study, or research.

Resource Management (RESM)

RESM 140. Sustainable Living. 3 Hours.
Explores the personal, social, economic and environmental aspects of making sustainable choices. Sustainability principles and practices are discussed along with assessments of consumption and lifestyle decisions. Also listed as DSGN 140 and PLSC 140.

RESM 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

RESM 390. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

RESM 405L. 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 440. Foundations of Applied Geographic Information Systems. 3 Hours.
PR: Corequisite of RESM 440L. An introductory course designed to provide the necessary background and techniques to use GIS technology to analyze and solve spatial problems. An emphasis is placed on acquisition, management, and manipulation of spatial data.

RESM 440L. Foundations of Applied Geographic Information Systems Laboratory. 0 Hours.
Coreq: RESM 440. Foundations of Applied Geographic Information Systems - RESM 440 Laboratory.

RESM 443. Intro GIS for Trail Planners. 2 Hours.
Introduce technical skills to support site analysis and mapping geographic constraints for trail planning, focusing on technological tools available to new GIS users. The goal of this course is to introduce Geographic Information Systems (GIS) and build foundations in its use to allow students to solve spatial problems. Specifically, the course will teach students necessary spatial and quantitative analysis methods.

RESM 444. Advanced GIS for Natural Resource Management. 3 Hours.
PR or CONC: RESM 440 with a minimum grade of C- or consent. Provides advanced training using geographic information systems to address the spatial issues of managing natural resources.

RESM 445. 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 450. Land Use Planning Law. 3 Hours.
Focus is on identification and understanding of legal issues related to planning and land use. This involves understanding rights, regulations, and responsibilities associated with land use, planning, and related activities.

RESM 455. Practice of Land Use Planning. 3 Hours.
Examines comprehensive land use planning including planning's origin and evolution plus the processes used to create and implement a plan. Focus is on land use and how it relates to other issues.

RESM 460. Energy Project and Program Management. 3 Hours.
PR: Junior or Senior Standing. The concepts and best practices of modern project management as applied to manage activities that meet the requirements of energy and environmental resource industry related programs and projects.

RESM 475. Solar PV Technology & Policy Fundamentals. 3 Hours.
This course will provide the student with an overview of solar PV technology. The student will also be introduced to key energy policies and economic influences on today’s solar market.

RESM 480. Environmental Regulation. 3 Hours.
Course focusing on laws and policies applicable to the environment. Students will learn to read and interpret statutes, regulations and cases that impact water, air, toxic substances, land and endangered species.

RESM 491. Professional Field Experience. 1-18 Hours.
PR: Consent (may be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

RESM 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

RESM 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

RESM 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

RESM 496. Senior Thesis. 1-3 Hours.
PR: Consent.

RESM 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Veterinary Science (VETS)

VETS 110L. Introduction to Veterinary Technology. 1 Hour.
This introductory course provides students with hands-on skills to the profession of veterinary technology. The student will cover topics in hospital operation, professional standards and ethics, and overview of the major components of the veterinary technician industry. Introduction to common clinical procedures and animal health care. Lab includes restraint, lab procedures, and administration of medicines.

VETS 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

VETS 302. Animal Pathology. 3 Hours.
PR: ANPH 301 or consent. Diseases of farm animals with special emphasis on their cause, prevention, and control.

VETS 400. Veterinary Medical and Surgical Nursing Care 1. 4 Hours.
PR or CONC: (A&VS 150 and A&VS 251 and VETS 110L) with a minimum grade of C- in all. An in-depth study of animal patient care and surgical nursing focusing on elements of small and large animal surgical nursing, surgical assistance, surgical instrumentation, suture material, aseptic technique, parasitology, blood analysis and chemistry's, pharmacology, anesthesiology, exotics, radiography, and dentistry.

VETS 401. Veterinary Anatomy. 3 Hours.
PR: Junior standing or consent. Functional study of domestic and farm animal anatomy.

VETS 401L. Veterinary Anatomy Laboratory. 1 Hour.
PR or CONC: VETS 401 and Junior standing. Gross dissection techniques used for the study of functional anatomy in domestic animals.

VETS 402. Veterinary Medical and Surgical Nursing Care 2. 4 Hours.
PR or CONC: (A&VS 150 and A&VS 251 and VETS 110L and VETS 400) with a minimum grade of C- in all. The continuation of an in-depth study of animal patient care and surgical nursing focusing on elements of small and large animal surgical nursing, surgical assistance, surgical instrumentation, suture material, aseptic technique, parasitology, blood analysis and chemistry's, pharmacology, anesthesiology, exotics, radiography, and dentistry.

VETS 405. Parasitology. 3 Hours.
PR: (BIOL 101 and BIOL 101L and BIOL 102 and BIOL 102L) or (BIOL 115 and BIOL 115L) and PR or CONC: VETS 405L. Common parasites of farm animals, their life cycles, effects on the host, diagnosis, control, and public health importance.

VETS 405L. Parasitology Laboratory. 1 Hour.
PR or CONC: VETS 405. Parasitology - VETS 405 Laboratory.

VETS 411. Principles of Laboratory Animal Science. 3 Hours.
PR: Consent for undergraduates. The production, genetics, physiology, nutrition, disease and regulations of laboratory animals used in research and teaching. This course meets minimal requirements for laboratory animal technical certification programs of the American Association of Laboratory Animal Science (AALAS).

VETS 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

VETS 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

VETS 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

VETS 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

VETS 496. Senior Thesis. 1-3 Hours.
PR: Consent.

VETS 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.

Wildlife and Fisheries Management (WMAN)

WMAN 100. The Tradition of Hunting. 3 Hours.
Introduction to the cultural and spiritual role of hunting; use of hunting as a wildlife management tool; and its economic value in wildlife conservation programs. Includes discussions on gun control, anti-hunting, and animal rights.

WMAN 150. Principles of Conservation Ecology. 3 Hours.
Overview of the science of conservation ecology with emphasis on the concepts of biological diversity, extension, habitat loss and fragmentation, establishment of protected areas, endangered species, and establishment and preservation of new populations.

WMAN 160. Ecology of Invading Species. 3 Hours.
Survey of invasive/exotic plant and animal species and their effects on native ecosystems, including the breakdown of natural barriers to invasion by the increase of world commerce which unifies widely dispersed resources.

WMAN 175. Introduction to Wildlife and Fisheries. 3 Hours.
PR: Corequisite of WMAN 175L. Introduction to the study and management of wildlife and fisheries resources of the Appalachians. Includes an overview of resource management history, career opportunities, natural resources policy, and the basic life of birds, mammals, and fishes.

WMAN 175L. Introduction to Wildlife and Fisheries Laboratory. 0 Hours.
PR: Corequisite of WMAN 175. Introduction to Wildlife and Fisheries - WMAN 175 Laboratory.

WMAN 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

WMAN 200. Restoration Ecology. 3 Hours.
Principles and practice of restoring natural ecosystem function, structure, and integrity.

WMAN 205. Wildlife Summer Field Camp. 3 Hours.
This is a field-intensive, orientation course in field ecology and wildlife techniques. It is designed to immerse the beginning wildlife professional to the art and science of collecting data on wildlife and their habitats. Knowledge of animal-habitat relations and field techniques is critical to management of these resources.

WMAN 206. Fisheries Summer Field Camp. 3 Hours.
A course in field ecology and fisheries sampling techniques. Designed to introduce the beginning fisheries conservation professional to the science of collecting data on aquatic habitat, organisms, and fish populations in their natural habitats.

WMAN 207. International Conservation. 3 Hours.
PR or CONC: WMAN 150. This course enables students to participate in Education Abroad opportunities in other countries to conduct biodiversity research and learn about conservation issues facing that country. Students will be visiting a diverse range of ecosystems, conducting fish or wildlife research, and participating in several naturalist-led hikes. The selected place of travel may vary with each course offering.

WMAN 224. Vertebrate Natural History. 3 Hours.
PR: BIOL 102 and (BIOL 102L or BIOL 104) or BIOL 117 or consent and Coreq: WMAN 224L. Relationships of fish, amphibians, and reptiles to the forest, with emphasis on the ecology, taxonomy, evolution, natural history, and field identification of these groups. Laboratory emphasizes natural history and anatomy of fish, amphibians, and reptiles.

WMAN 224L. Vertebrate Natural History Laboratory. 0 Hours.
PR: Corequisite of WMAN 224. Vertebrate Natural History - WMAN 224 Laboratory.

WMAN 250. Big Game Ecology and Management. 3 Hours.
Intensive field trip and online material emphasizing white tailed deer and black bear ecology with additional material on western game species and exotics.

WMAN 260. Waterfowl Ecology. 3 Hours.
Intensive field-trip and on-line material emphasizing the ecology of waterfowl and management of wetland habitats.

WMAN 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

WMAN 298. Honors. 1-3 Hours.
PR: Students in the Honors Program and consent by the honors director. Independent reading, study or research.

WMAN 300. Wildlife and Fisheries Techniques. 4 Hours.
PR: (CS 101 or FOR 240) and STAT 211 and PR or CONC: RESM 440 with a minimum grade of C- in each and Coreq: WMAN 300L. Field and laboratory techniques for the scientific management and evaluation of wildlife and fisheries resources.

WMAN 300L. Wildlife and Fisheries Techniques Laboratory. 0 Hours.
PR: Corequisite of WMAN 300. Wildlife and Fisheries Techniques - WMAN 300 Laboratory.

WMAN 311. Silvicultural Applications for Wildlife. 4 Hours.
PR: FNRS 205 and FNRS 205L with a minimum grade of C-. Silvicultural concepts and applications with an emphasis on wildlife habitat management. Topics will include: site quality assessment, forest sampling, tree and stand growth and development, silvicultural treatments and regeneration systems. Field exercises will focus on practical application of silvicultural concepts.

WMAN 311L. Silvicultural Appl Wildlife Laboratory. 0 Hours.
PR: FNRS 205 and FNRS 205L with a minimum grade of C- in each and Coreq: WMAN 311. Silvicultural Applications for Wildlife - WMAN 311 Laboratory.

WMAN 313. Wildlife Ecosystem Ecology. 4 Hours.
PR: ((BIOL 101 and BIOL 101L and BIOL 102 and BIOL 102L) or (BIOL 115 and BIOL 117)) and (MATH 124 or higher) and Coreq: WMAN 313L. Basic principles of ecosystem, community, and population ecology. Emphasizing structure, function, succession, physiological ecology, population growth and regulation, and systems modeling.

WMAN 313L. Wildlife Ecosystem Ecology Laboratory. 0 Hours.
PR: Corequisite of WMAN 313. Wildlife Ecosystem Ecology - WMAN 313 Laboratory.

WMAN 314. Marine Ecology. 3 Hours.
Study of key coastal species and their interactions. Self-paced lectures and exercises culminating with one-week capstone trip to Atlantic coast for hands-on study of invertebrates, coastal fishes and birds, and marine ecology.

WMAN 330. Conservation Genetics. 3 Hours.
PR: BIOL 101 and BIOL 102 or equivalent or higher and MATH 124 or higher. Introduction to the principles of modern genetics needed to understand and manage important challenges in conservation of biodiversity including game, non-game, and endangered/threatened species. Also listed as GEN 330.

WMAN 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

WMAN 411. Introduction to Quantitative Ecology. 3 Hours.
PR: STAT 211 with a minimum grade of C-. Introduction to quantitative techniques unique to the analysis of fish and wildlife data.

WMAN 425. Mammalogy. 4 Hours.
PR: WMAN 224 with a minimum grade of C-. Mammals and their biological properties with emphasis on life history, ecology, and distribution of regional forms.

WMAN 425L. Mammalogy Laboratory. 0 Hours.
PR: WMAN 224 with a minimum grade of C- and Coreq: WMAN 425. Mammalogy - WMAN 425 Laboratory.

WMAN 426. Ornithology. 3 Hours.
PR: WMAN 224 and Coreq: WMAN 426L. Identification, distribution, and ecology of birds (particularly of forest lands.).

WMAN 426L. Ornithology Laboratory. 0 Hours.
PR: Corequisite of WMAN 426. Ornithology - WMAN 426 Laboratory.

WMAN 427. Herpetology. 3 Hours.
PR: WMAN 224 with a minimum grade of C-. Identification, biology, ecology, and conservation of reptiles and amphibians, with emphasis on species found in the state of West Virginia.

WMAN 445. Fisheries Management. 4 Hours.
PR: Corequisite of WMAN 445L. Basic principles of management of fishery resources, with an emphasis on freshwater stocks. Includes current environmental and management issues, concepts, and methods used in management of fisheries.

WMAN 445L. Introduction to Fisheries Management Laboratory. 0 Hours.
PR: Corequisite of WMAN 445. Introduction to Fisheries Management - WMAN 445 Laboratory.

WMAN 446. Freshwater Ecology. 4 Hours.
PR: (BIOL 101 and BIOL 102 and BIOL 103 and BIOL 104) or BIOL 115 or WMAN 224 or consent and Coreq: WMAN 446L. Physical, chemical, and biological characteristics of inland waters with emphasis on the structure and function of stream ecosystems.

WMAN 446L. Freshwater Ecology Laboratory. 0 Hours.
PR: Corequisite of WMAN 446. Freshwater Ecology - WMAN 446 Laboratory.

WMAN 450. Advanced Wildlife and Fisheries Management. 4 Hours.
PR: WMAN 300 and Coreq: WMAN 450L. Principles and practices of wildlife and fisheries habitat and species management.

WMAN 450L. Advanced Wildlife and Fisheries Management Laboratory. 0 Hours.
PR: Corequisite of WMAN 450. Advanced Wildlife and Fisheries Management - WMAN 450 Laboratory.

WMAN 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

WMAN 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

WMAN 492. Directed Study. 1-3 Hours.
Directed study, reading and/or research.

WMAN 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

WMAN 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

WMAN 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

WMAN 496. Senior Thesis. 1-3 Hours.
PR: Consent.

WMAN 498. Honors. 1-3 Hours.
PR: Students in the Honors Program and consent by the honors director. Independent reading, study or research.

Wood Science (WDSC)

WDSC 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

WDSC 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

WDSC 337L. Wood Adhesion and Finishing Laboratory. 0 Hours.
Coreq: WDSC 337. Wood Adhesion and Finishing - WDSC 337 Laboratory.

WDSC 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

WDSC 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

WDSC 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

WDSC 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

WDSC 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

WDSC 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

WDSC 496. Senior Thesis. 1-3 Hours.
PR: Consent.

WDSC 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.