

## Forestry Course Descriptions – WVU

Please go to [coursecatalog.wvu.edu/collegepdf/agfor.pdf](http://coursecatalog.wvu.edu/collegepdf/agfor.pdf) for more information.

### Forest Hydrology (FHYD)

444. *Watershed Management*. II. 3 Hr. PR: FMAN 212 and FMAN 311. (Primarily for forest management majors.) Influences of silvicultural practices and forest management activities on the hydrology of forested catchments.

### Forest Management (FMAN)

212. *Forest Ecology*. I, II. 3 Hr. PR: FOR 205. Forest and environment factors; site and type characteristics.

222. *Forest Mensuration*. II. 4 Hr. PR: MATH 155 and STAT 211. Estimating volume and growth of trees and forest stands with emphasis on the mathematical and statistical techniques involved. Laboratories include practical field experience.

311. *Silvicultural Systems*. I. 4 Hr. PR: FOR 205 and ((FMAN 212 and FMAN 322) or WMAN 313). 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.

316. *Forest Genetics and Tree Improvement*. II. 3 Hr. Forest genetic principles and their application to forest tree improvement, including crossing methods, selection systems and other techniques.

322. *Advanced Forest Measurements*. I. 3 Hr. PR: FMAN 322 or equivalent. Measurement and computer simulation of forest growth; principles of growth and yield; statistical methods applied to forest measurement problems.

330. *Principles of Forestry Economics*. II. 4 Hr. PR: (ECON 201 or ARE 150) and ECON 202. Production, distribution and use of forest goods and services. Emphasis on methods and problem solving techniques in the economic aspects of forestry.

400. *Forest Resources Management Field Practice*. S. 6 Hr. PR: CE 200 and FMAN 322. (Course will be taught during five consecutive six-day weeks.) 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.

413. *Regional Silviculture*. I. 2 Hr. PR: Forestry major or Consent, FMAN 212; PR or CONC: FMAN 311. Major forest types of the United State: their composition, management, problems, and silvicultural treatment.

433. *Forest Management*. I. 3 Hr. PR: FMAN 400 and FMAN 311 and FMAN 330. 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.

434. *Forest Resources Management Planning*. II. 3 Hr. PR: FMAN 322 and FMAN 400 and FMAN 311 and PR or CONC: (ENTO 470 or PPTH 470) and FMAN 330. 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.

440. *Forestry Consulting*. 3 Hr. PR: FMAN 311 and FMAN 330 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.

490. *Teaching Practicum*. I, II, S. 1-3 Hr. PR: Consent. Teaching practice as a tutor or assistant.

491. *Professional Field Experience*. I, II, S. 1-18 Hr. 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.

493. *Special Topics*. I, II, S. 1-6 Hr. PR: Consent. Investigation of topics not covered in regularly scheduled courses.

494. *Seminar*. I, II, S. 1-3 Hr. PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

496. *Senior Thesis*. I, II, S. 1-3 Hr. PR: Consent.

498. *Honors*. I, II, S. 1-3 Hr. PR: Students in Honors Program and Consent by the Honors Director. Independent study, reading or research.

## **Forestry (FOR)**

101. *Careers in Natural Resources Management*. I. 1 Hr. (Required only for students who rank as freshman in the Division of Forestry.) 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.

140. *West Virginia's Natural Resources*. I, II, S. 3 Hr. Survey of policies and practices in development and use of soil, water, forest, wildlife, mineral, and human resources in West Virginia.

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

205. *Dendrology*. I. 3 Hr. Classification and silvical characteristics of North American forest trees.

240. *Introduction to Computing in Natural Resources*. 3 Hr. Introduction to computer applications in natural resource management. Emphasis on MS Excel statistical analysis tools, MS Access, Visual Basic Programming, hand held PC's and application examples.

326. *Remote Sensing of Environment*. II. 2 Hr. PR: MATH 126 and MATH 128. Measurement and interpretation of natural resources and environment from photography and radar, infrared, and microwave imagery.

421. *Renewable Resources Policy and Governance*. 3 Hr. 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. (Cross listed with WMAN 421.)

425. *Global Forest Resources*. II. 3 Hr. 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.

438. *Human Dimensions Natural Resource Management*. 3 Hr. 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.

470 A-Z. *Problems in Forestry, Wood Science, Wildlife, or Recreation*. I, II, S. 1-4 Hr. PR: Forestry Senior or Consent.

490. *Teaching Practicum*. I, II, S. 1-3 Hr. PR: Consent. Teaching practice as a tutor or assistant.

491. *Professional Field Experience*. I, II, S. 1-18 Hr. 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.

492. *Directed Study*. I, II, S. 1-6 Hr. Directed study, reading, and/or research.

493 A-Z. *Special Topics*. I, II, S. 1-6 Hr. PR: Consent. Investigation of topics not covered in regularly scheduled courses.

494. *Seminar*. I, II, S. 1-3 Hr. PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

495. *Independent Study*. I, II, S. 1-6 Hr. Faculty supervised study of topics not available through regular course offerings.

496. *Senior Thesis*. I, II, S. 1-3 Hr. PR: Consent.

498. *Honors*. I, II, S. 1-3 Hr. PR: Students in Honors Program and Consent by the Honors Director. Independent reading, study or research.

## **Agricultural and Extension Education (AGEE)**

101. *Global Food and Agricultural Industry*. I, II. 3 Hr. 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.

110. *Microcomputer Applications in Agricultural Education*. 3 Hr. 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.

220. *Group Organization and Leadership*. I. 3 Hr. 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.

250. *Shop Theory and Methods*. I. 4 Hr. Six areas of basic shop work: carpentry, cold metal work, hot metal work (forge, electric and gas welding), sheet metal (soldering, forming, cutting, riveting), tool care, and plumbing. (1 hr. rec., 6 hr. lab.)

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

430. *Methods of Teaching Agriculture*. I. 3 Hr. PR: Consent. Organization and preparation for teaching agriculture in middle and secondary schools.

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

434. *Managing Learning Environment*. I, II. 3 Hr. PR: AGEE 430 or Consent. Principles/process in organizing and managing all components of the secondary agricultural education learning environment to maximize student achievement.

438. *Ag Ed Curriculum Development*. II. 2 Hr. PR: AGEE 430 or Consent. Development, organization, preparation and evaluation of materials/curriculum for teaching agriculture in middle and secondary schools.

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

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

450. *Farm Structures*. II. 3 Hr. Study of structures required for agriculture, family housing, storage, and recreation. Includes function, planning, layout, materials, construction techniques, prefabrication, repair, remodeling, and costs. (2 hr. rec., 3 hr. lab.)

451. *Agricultural Engines*. I, II. 3 Hr. Study of power sources (gasoline, diesel, turbine, wankel, etc.) for agriculture and forestry. Operating, selection, maintenance techniques, and emissions impact on power and fuel efficiency. (2 hr. rec., 3 hr. lab.)

452. *Advanced Farm Machinery*. I. 3 Hr. 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.)

453. *Electricity and Lighting*. 3 Hr. Properties of electricity and electrical circuits, residential wiring, selection of electric motors, use of electrical controls; and design of interior lighting, landscape lighting, and flood lighting systems. (Field trip required.)

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

455. *Advanced Farm Mechanics*. 3 Hr.

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

461. *Waste Management-Composting*. I. 3 Hr. 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.

488. *Professional Agricultural Internship*. 1-12 Hr. PR: Consent.

490. *Teaching Practicum*. I, II, S. 1-3 Hr. PR: Consent. Teaching practice as a tutor or assistant.

491. *Professional Field Experience*. I, II, S. 1-18 Hr. 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.

493 A-Z. *Special Topics*. I, II, S. 1-6 Hr. PR: Consent. Investigation of topics not covered in regularly scheduled courses.

494 A-Z. *Seminar*. I, II, S. 1-3 Hr. PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

495. *Independent Study*. I, II, S. 1-6 Hr. Faculty supervised study of topics not available through regular course offerings.

496. *Senior Thesis*. I, II, S. 1-3 Hr. PR: Consent.

498. *Honors*. I, II, S. 1-3 Hr. PR: Students in Honors Program and Consent by the Honors Director. Independent reading, study or research.

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

110. *Agribusiness Accounting*. II. 3 Hr. 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.)

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

187. *Energy Resource Economics*. I, II. 3 Hr. 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.

188. *National Energy Policy*. II. 3 Hr. Resource and energy policy problems on a national level, including mineral import quotas, prorationing, federal tax and land-law policy, leasing, mineral research and education, health, and social concerns.

199. *Orientation to Agriculture and Resource Economics*. 1 Hr. Orientation to degree programs and requirements, departmental resources, curriculum options, student responsibilities and opportunities.
201. *Principles of Resource and Energy*. II. 3 Hr. 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.)
204. *Agribusiness Management*. II. 3 Hr. 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.
220. *Introductory Environmental and Resource Economics*. II. 3 Hr. 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.
- 293 A-Z. *Special Topics*. I, II, S. 1-6 Hr. PR: Consent. Investigation of topics not covered in regularly scheduled courses.
370. *Recreation/Tourism Economics*. 3 Hr. PR: ARE 220 or Consent. Principles of economic analysis as applied to recreation and tourism resources, including economic impact and cost-benefit analyses.
382. *Agricultural and Natural Resources Law*. I. 3 Hr. Introduction to legal concepts, principles and practices related to environmental, natural resource, and agricultural issues; in the context of the legal system within which statutes are enacted, administered and enforced.
401. *Applied Demand Analysis*. II. 3 Hr. 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.
402. *Applied Production Economics*. I. 3 Hr. Production economics applied to agricultural, environmental, and resource issues; production, multiple-product, and cost functions, and joint production; effects of environmental and natural resource management regulations on the production process.
406. *Applied Quantitative Methods*. 3 Hr. 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.
410. *Environmental and Resource Economics*. I. 3 Hr. PR: (ARE 401 and ARE 402) or ECON 301 or Consent. 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" issue.
411. *Rural Economic Development*. I. 3 Hr. 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.
413. *Economic Development*. I, II. 3 Hr. PR: ECON 201 and ECON 202. The problems, changes and principal policy issues faced by nonindustrialized countries.
420. *Agricultural Cooperatives*. I. 3 Hr. History, principles, organization, management, taxation, and legal aspects of agricultural, marketing, supply and service cooperatives in the U.S. Development of non-agricultural cooperatives. (Offered in fall of odd years.)
421. 4 Hr. PR: ARE 110 and ARE 204 or consent. Introduction to concepts, methods and strategies involved in starting a successful small private enterprise in a rural area: assessing a community for enterprise opportunities, identifying and developing an enterprise idea, and preparing an enterprise plan.
431. *Marketing Agricultural Products*. II. 3 Hr. 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.

435. *Marketing Livestock Products*. I. 3 Hr. 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. (Offered in fall of even years.)

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

445. *Energy Economics*. II. 3 Hr. 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.

450. *Agriculture, Environmental and Resource Policy*. II. 3 Hr. PR: (ARE 401 and ARE 402) or ECON 301 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.

461. *Agribusiness Finance*. II. 3 Hr. An overview of financial analysis and the application of financial principles to small, rural and agricultural businesses. Includes applications of financial analysis computer software.

490. *Teaching Practicum*. I, II, S. 1-3 Hr. PR: Consent. Teaching practice as a tutor or assistant.

491. *Professional Field Experience*. I, II, S. 1-18 Hr. 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.

493 A-Z. *Special Topics*. I, II, S. 1-6 Hr. PR: Consent. Investigation of topics not covered in regularly scheduled courses.

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496. *Senior Thesis*. I, II, S. 1-3 Hr. PR: Consent.

498. *Honors*. I, II, S. 1-3 Hr. PR: Students in Honors Program and Consent by the Honors Director. Independent reading, study or research.

## **Agricultural Biochemistry (AGBI)**

199. *Orientation to Biochemistry*. 1 Hr. Orientation to degree programs and requirements, departmental resources, curriculum options, student responsibilities and opportunities.

410. *Introductory Biochemistry*. I, II. 3 Hr. PR: 8 hr. general chemistry, CHEM 231 or equivalent. Introduction to chemistry of cellular constituents (proteins, amino acids, carbohydrates, lipids, nucleic acids, enzymes and coenzymes) and their metabolism in animals and plants.

411. *Introductory Biochemistry Laboratory*. I. 1 Hr. CONC: AGBI 410. Experiments to demonstrate certain principles and properties of animal and plant biochemicals.

480. *Assigned Topics*. 1-4 Hr.

490. *Teaching Practicum*. I, II, S. 1-3 Hr. PR: Consent. Teaching practice as a tutor or assistant.

491. *Professional Field Experience*. I, II, S. 1-18 Hr. 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.

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494. *Seminar*. I, II, S. 1-3 Hr. PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

496. *Senior Thesis*. I, II, S. 1-3 Hr. PR: Consent.

498. *Honors*. I, II, S. 1-3 Hr. PR: Students in Honors Program and Consent by the Honors Director. Independent reading, study or research.

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

293 A-Z. *Special Topics*. 1-6 Hr. PR: Consent Investigation of topics not covered in regularly scheduled courses.

480. *Assigned Topics*. I, II, S. 1-4 Hr. 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.

490. *Teaching Practicum*. I, II, S. 1-3 Hr. PR: Consent. Teaching practice as a tutor or assistant.

491. *Professional Field Experience*. I, II, S. 1-18 Hr. 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.

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

494. *Seminar*. I, II, S. 1-3 Hr. PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

495. *Independent Study*. I, II, S. 1-6 Hr. Faculty supervised study of topics not available through regular course offerings.

496. *Senior Thesis*. I, II, S. 1-3 Hr. PR: Consent.

498. *Honors*. I, II, S. 1-3 Hr. PR: Students in Honors Program and Consent by the Honors Director. Independent reading, study or research.

## **Agronomy (AGRN)**

125. *Soil Judging*. I. 1 Hr. PR: Consent. Field study of soils for classification and land use evaluation. 3 hr. lab. (May be repeated for max. 3 credits.)

202. *Principles of Soil Science*. I, II. 3 Hr. PR: CHEM 111 or equiv. and PR or CONC: AGRN 203. 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.

203. *Principles of Soil Science Laboratory*. I, II. 1 Hr. PR or CONC: AGRN 202 or Consent. Regional campus concurrent.

315. *Turfgrass Management*. 3 Hr. 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.) (Offered in fall of odd years.)

410. *Soil Fertility*. I. 3 Hr. PR: AGRN 202 and AGRN 203 and CHEM 116. 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. (3 hr. lec.)

415. *Soil Survey and Land Use*. I. 3 Hr. PR: AGRN 125 or Consent. 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. (2 hr. lec., 3 hr. lab.) (Offered in fall of odd years.)

417. *Soil Genesis and Classification*. I. 4 Hr. PR: AGRN 125 or Consent. 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. (3 hr. lec., 3 hr. lab.) (Offered in fall of even years.)

420. *Soil Microbiology*. I. 3 Hr. PR: ENVM 341. Microbiology and biochemistry of the soil environment. Occurrence, distribution, ecology, and detection of micro-organisms in soil. (Offered in fall of even years. Also listed as ENVM 420 and ENVP 420.)

425. *Environmental Soil Management*. II. 3 Hr. PR: AGRN 202 and AGRN 203. 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.)

430. *Soil Physics*. II. 3 Hr. PR: AGRN 202 and AGRN 203. Physical properties of soils; water and air relationships and their influence on soil productivity. (Offered in spring of even years.)

451. *Principles of Weed Control*. I. 3 Hr: PLSC 206 and AGRN 202 and AGRN 203 or consent. Fundamental principles of weed science. Identification of common weeds, biology, ecology and control measures. (Offered in fall of odd years.) (Also listed as ENVP 451.)

452. *Grain and Special Crops*. II. 3 Hr. 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. (Offered in spring of even years.)

454. *Forage Crops*. I. 3 Hr. 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.)

455. *Reclamation of Disturbed Soils*. II. 3 Hr. 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.)

490. *Teaching Practicum*. I, II, S. 1-3 Hr. PR: Consent. Teaching practice as a tutor or assistant.

491. *Professional Field Experience*. I, II, S. 1-18 Hr. 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.

493. *Special Topics*. I, II, S. 1-6 Hr. PR: Consent. Investigation of topics not covered in regularly scheduled courses.

494. *Seminar*. I, II, S. 1-3 Hr. PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

496. *Senior Thesis*. I, II, S. 1-3 Hr. PR: Consent.

498. *Honors*. I, II, S. 1-3 Hr. PR: Students in Honors Program and Consent by the Honors Director. Independent reading, study or research.

## **Environmental Protection (ENVP)**

155. *Elements of Environmental Protection*. II. 3 Hr. 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.

355. *Environmental Sampling and Analysis*. I. 3 Hr. 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.

401. *Environmental Microbiology*. II. 4 Hr. PR: ENVM 341 or Consent. Microbiology as applied to soil, water, wastewater, sewage, air, and the general environment. Occurrence, distribution, ecology, detection of microorganisms in these environments. (Also listed as ENVM 401.)

412. *Pest Management*. II. 3 Hr. 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. (3 hr. lec.) (Also listed as ENTO 412.)

420. *Soil Microbiology*. I. 3 Hr. PR: ENVM 341. Microbiology and biochemistry of the soil environment. Occurrence, distribution, ecology, and detection of micro organisms in soil. (Offered in fall of even years. Also listed as ENVM 420 and AGRN 420.)

425. *Environmental Soil Management*. II. 3 Hr. PR: AGRN 202 and AGRN 203. 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 AGRN 425).

451. *Principles of Weed Control*. I. 3 Hr. PR: PLSC 206 and AGRN 202 and AGRN 203 or consent. Fundamental principles of weed science. Identification of common weeds, biology, ecology and control measures. (Offered in Fall of odd years.) (Also listed as AGRN 451.)

455. *Reclamation of Disturbed Soils*. 3 Hr. 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 AGRN 455.)

460. *Environmental Impact Assessment*. I. 3 Hr. PR: BIOL 101 and BIOL 102 and BIOL 103 and BIOL 104 and CHEM 115 and CHEM 116. 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.