Environmental and Energy Resources Management (E*Quad)

Bachelor of Science - Environmental & Energy Resources Management (E*Quad)

The objective of this major is to examine the interdisciplinary relationships involved in the business of energy production and utilization along with associated environmental management, regulatory and policy issues. This major will provide a strong foundation for students interested in pursuing a career in the growing energy and environmental sectors of the economy, whether in private business, government, consulting, or for entrepreneurial ventures of their own design. Upon completion of this degree, students are expected to understand how to coordinate the management of these resources across regulatory, institutional and socio-economic structures. Selected students, upon completion of this degree, may find it desirable to obtain a graduate degree to further expand their career opportunities.

GENERAL EDUCATION CURRICULUM

Please use this link to view a list of courses that meet each GEC requirement. (http://registrar.wvu.edu/current_students/general_education_curriculum)

NOTE: Some major requirements will fulfill specific GEC requirements. Please see the curriculum requirements listed below for details on which GECs you will need to select.

General Education Curriculum

| ENGL 101 & ENGL 102 or ENGL 103 | Composition And Rhetoric and Composition And Rhetoric or Accelerated Academic Writing | 3-6 |
| GEC 2A - Mathematics | 3-4 |
| GEC 2B - Natural and Physical Science | 7-8 |
| GEC 2C - Additional GEC 2A, B or C | 3 |
| GEC 3 - The Past and Its Traditions | 3 |
| GEC 4 - Issues of Contemporary Society | 3 |
| GEC 5 - Artistic Expression | 3 |
| GEC 6 - The Individual in Society | 3 |
| GEC 6F - First Year Seminar | 1-3 |
| GEC 7 - American Culture | 3 |
| GEC 8 - Western Culture | 3 |
| GEC 9 - Non-Western Culture | 3 |

Total Hours

38-45

CURRICULUM REQUIREMENTS

Courses to provide a fundamental understanding of each of the 4 E's (Energy, Environment, Entrepreneurship, and Economics)

GEC Requirements

| ARE 150 | Intro Agri & Agribusiness Econ |
| ARE 110 | Agribusiness Accounting |
| ARE 187 | Energy Resource |
| BIOL 101 & BIOL 103 | General Biology and General Biology Laboratory |
| ECON 202 | Principles of Macroeconomics |
| MATH 150 | Applied Calculus |
| PHYS 101 | Introductory Physics |
| PLSC 206 | Principles of Plant Science |

Major requirements

| ARE 199 | Orientation - Agr/Resourc Econ |
| ARE 201 | Principle Resource & Energy |
ARE 382  Agri and Natural Resources Law  3
ARE 421  Rural Enterprise Development  4
ARE 445  Energy Economics  3
RESM 440  Foundations of Applied GIS  2
RESM 441  Intro GIS Natural Sciences  1
or RESM 442  Intro GIS Social Science  
RESM 480  Environmental Regulation  3
RESM 491  Professional Field Experience  5
RESM 494  Seminar  1
Writing Course  3
Free Electives to reach minimum 120 credits for degree  17-23
Restricted Electives  36
Restricted electives will be selected from the lists below in each area in consultation with the advisor. With the exception of ENGR 101, all courses are to be at least at the 200 level.

Economics (Select at least 3 courses):
- ARE 220  Intro Environment/Resource Econ
- ARE 401  Applied Demand Analysis
- ARE 410  Environment/Resource Economics
- ARE 450  Agr/Environmtl & Resource Policy
- ECON 302  Intermed Macro-Economic Theory

Energy (Select at least 3 courses):
- DSGN 340  Design for Energy Efficiency
- DSGN 470  LEED Green Building Systems
- ENGR 100 Level Course
- RESM 480  Environmental Regulation
- WDSC 444  Bio-based Energy Systems

Entrepreneurship (Select at least 3 courses):
- AGEE 421  Agri/Natural Res Communicatns
- ARE 204  Agribusiness Management
- or BUSA 320  Survey of Management
- ARE 431  Marketing Agricultural Product
- or BUSA 330  Survey of Marketing
- ARE 461  Agribusiness Finance
- or BUSA 340  Survey of Finance

Environment (Select at least 3 courses):
- ARE 450  Agr/Environmtl & Resource Policy
- AGRN 455  Reclamation of Disturbed Soils
- or ENVP 455  Reclamation of Disturbed Soils
- ENVP 355  Environmentl Sampling/Analysis
- ENVP 415  Hazardous Waste Training
- ENVP 455  Reclamation of Disturbed Soils
- ENVP 460  Environmental Impact Assessmnt
- GEOG 205  Natural Resources
- GEOG 207  Climate And Environment
- GEOG 415  Global Environmental Change
- WMAN 200  Restoration Ecology

Total Hours  120-133

SUGGESTED PLAN OF STUDY

First Year

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<tr>
<th>Fall</th>
<th>Hours Spring</th>
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<tr>
<td>ENGL 101</td>
<td>3 PHYS 101</td>
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<td>Course</td>
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<td>MATH 150</td>
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<td>BIOL 101</td>
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<td>BIOL 103</td>
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<td>ARE 187</td>
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<td>WVUE 191</td>
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**Second Year**

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<th>Course</th>
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<tr>
<td>ENGL 102</td>
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<td>ARE 199</td>
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<td>3 ARE 450</td>
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<td>ARE 110</td>
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<td>3 ARE 220</td>
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<td>ENGR 100 Level Course</td>
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<td>3 GEOG 205</td>
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**Third Year**

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<tr>
<td>ARE 421</td>
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<td>3 RESM 480</td>
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<td>ARE 382</td>
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<tr>
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<td>Environment</td>
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<td>ARE 431</td>
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<td>DSGN 340</td>
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<td>3 AGEE 421</td>
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<td>RESM 440</td>
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**Fourth Year**

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<td>ARE 410</td>
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<td>ARE 401</td>
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<td>ECON 301</td>
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<td>Entrepreneurship</td>
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<td>ARE 445</td>
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<td>Environment</td>
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<td>Free Elective</td>
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**Total credit hours: 120**

**AGRICULTURE RESOURCE ECON COURSES**

**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. Intro Agri & Agribusiness Econ. 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. 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 199. Orientation - Agr/Resourc Econ. 1 Hour.
Orientation to degree programs and requirements, departmental resources, curriculum options, student responsibilities and opportunities.

ARE 201. Principle Resource & 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. Intro Environmntl/Resource Econ. 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 293A-Z. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

ARE 298A-Z. 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 370. Recreation/Tourism Economics. 3 Hours.
PR: ARE 220 or consent. Principles of economic analysis as applied to recreation and tourism resources, including economic impact and cost-benefit analyses.

ARE 382. Agri 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 393A-Z. 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. Environmentl/Resource Economcs. 3 Hours.
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.

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 421. Rural Enterprise Development. 4 Hours.
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.

ARE 431. Marketing Agricultural Product. 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 Market/Commodity Price. 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. Agr/Envrmntl & Resource Policy. 3 Hours.
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.

ARE 461. Agribusiness Finance. 3 Hours.
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 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 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

ARE 491. Prof Field Experience:Capstone. 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 492A-Z. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

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

ARE 494A-Z. 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:Capstone. 1-3 Hours.
PR: Consent.

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

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

RESOURCE MANAGEMENT COURSES

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 293A-Z. 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 391. Intro GIS Natural Sciences. 1 Hour.
Using Geographic Information Systems (GIS) to solve problems in environmental and natural resource management, taken concurrently with RESM 440.

RESM 392. Intro GIS Social Science. 1 Hour.
Using Geographic Information Systems (GIS) to solve problems in the social sciences, taken concurrently with RESM 440.

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

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

RESM 495. Independent Study. 1-3 Hours.
Faculty supervised study of topics not available through regular course offerings.

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

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