

UNDERGRADUATE HANDBOOK

Bachelor of Science in Resource Management

Majors Covered:

Agribusiness Management
Environmental and Energy Resources Management
Environmental and Natural Resource Economics

2016-2017

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Introduction

This handbook provides current and prospective West Virginia University students with background information about the degree, Bachelor of Science in Resource Management, offered by the Division of Resource Economics and Management in the Davis College of Agriculture, Natural Resources, and Design. Students considering transferring into this degree will find forms and information to see how their existing credits transfer into this degree program. These forms, in conjunction with DegreeWorks, can be used to chart progress towards completion of degree requirements.

The Division of Resource Economics and Management offers a diverse range of expertise and interests among its faculty. These interests include: agribusiness management, organic and local

food marketing, agricultural policy and environmental impacts, energy and its environmental impacts, environmental economics and policy, entrepreneurship, international, rural and regional development, sustainable agricultural development, and watershed management and water quality.

The Division of Resource Economics and Management offers a Bachelor of Science in Resource Management under three majors: (1) Agribusiness Management, (2) Environmental and Energy Resources Management, and (3) Environmental and Natural Resource Economics.

- The Agribusiness Management major is mainly intended for students who will pursue professional careers in private industry (with an emphasis in agribusiness or food), small business, or government agencies. The coursework requirements provide the graduate with a broad-based education, which enhances the student's ability to further his/her professional career skills. Interested students may prepare for graduate¹ or law school.
- The Environmental and Energy Resources Management major aims to provide a strong foundation for those students interested in pursuing a career focusing on the business and entrepreneurial aspects of the growing energy and environmental sector. Students completing this interdisciplinary major will be prepared for entrepreneurial ventures of their own design and for employment in the private sector or with government agencies or consulting firms. Upon completion of this degree, some students may find it desirable to obtain a graduate degree to further expand their career opportunities.
- The major in Environmental and Natural Resource Economics prepares students for careers in environmental policy and natural resource management. Students in this major are advised to select electives in the natural sciences to strengthen their science background. Because of the demand for positions in environmental and natural resource fields, graduates may wish to continue their education in graduate school. Thus, this major prepares students for graduate study in a number of areas: applied economics, business, environmental and resource economics, or law school.

In addition to a Bachelor of Science degree, three minors are offered within the program: (1) Agribusiness Management, (2) Agriculture and Natural Resources Law, and (3) Environmental Economics. To sign up for a minor, talk to your academic advisor. More information is available at: <http://catalog.wvu.edu/undergraduate/minors/>.

Vision Statement

The faculty in the Division of Resource Economics and Management will provide each undergraduate with an educational experience designed to facilitate his/her chosen career goal(s). Educational experiences will be provided under three majors: (1) Agribusiness Management, (2) Environmental and Energy Resources Management, and (3) Environmental and Natural Resource Economics. The goal of the Agribusiness Management major is to provide students with a breadth of knowledge in both the social and natural sciences upon which further professional training can be based. The goal of the Environmental and Energy Resources Management major is to provide students with the analytical framework, tool-kit and problem-solving skills to better function in a complex and changing energy, economy, and environmental management setting, and to better prepare them to conceive, develop and implement entrepreneurial ventures of their own design.

¹ Students wishing to prepare for graduate school are advised to select additional course work in quantitative methods and economic theory through discussion with his/her advisor.

The goal of the Environmental and Natural Resource Economics major is to provide students with the necessary training for the application of economic theory and analysis to natural resource and environmental management issues.

Fact Sheet Information

Basic facts of all majors:

- As of fall 2015, 257 students were enrolled: 144 in Agribusiness Management, 38 in Environmental and Natural Resource Economics, and 75 in Environmental and Energy Resources Management.
- At this time, in-state tuition applies for some out-of-state students.
- There are no restrictions on enrollment or pre-majors.
- A professional academic advisor advises incoming students, while faculty members serve as advisors and mentors to upper-class students.
- Degree programs are flexible to meet the interests of individual students.
- Many students are transfers from other majors, particularly Business & Economics, Animal Science, and Engineering.
- Most courses are located on the Evansdale campus.
- A capstone experience (consisting of an internship, senior thesis or study abroad) is required for graduation.
- Winners in the 2011, 2012, 2014, and 2015 WV Statewide Collegiate Business Plan Competition were from these majors.

Agribusiness Management major

- Student interests related to: food and agriculture, small business, or graduate/law school.
- Courses cover breadth of issues related to business: accounting, economic theory, enterprise development, finance, law, management, and marketing.
- Students in this major from Ohio may qualify for in-state tuition.
- Most students obtain private sector employment with: agribusiness firms, farms or small businesses.
- About 18% of graduates go on to graduate school.

Environmental and Energy Resources Management major

- Intended to produce graduates who comprehend the big picture about energy, and who will strengthen connections between students and the energy industry as well as the federal and state agencies that regulate it.
- Students in this major from Delaware, Virginia, and Maryland may qualify for in-state tuition.
- Most students obtain internships with energy-related industries and/or regulatory agencies.

Environmental and Natural Resource Economics major

- Prepares students for careers in environmental policy and natural resource management within private industry and government.
- Students in this major from Ohio may qualify for in-state tuition.
- Combines coursework in social and physical sciences.
- Most graduates obtain employment in the private sectors while about 20% go on to seek a graduate education.

Division of Resource Economics and Management Features

Spreadsheet, word processing, statistical, and econometric software packages are available in two college-maintained computer labs. Some computers have advanced graphics and geographical information system (GIS) software. These labs are used for teaching, but are generally open to students during the weekdays, evenings, and non-class times. In addition, the Natural Resource Analysis Center (NRAC) is closely associated with the program and has advanced computer facilities for geographical information systems and spatial analysis. NRAC frequently hires and trains undergraduate students to work on research projects.

Dr. Brown serves as Undergraduate Coordinator. She is assisted by faculty as well as the Division of Resource Economics and Management's professional academic advisor, Barry Stephens. Dr. Brown and Dr. Collins approve and oversee all student capstone experiences for the Division.

Capstone Experience

In order to better prepare students for their careers, a capstone experience is required of each student in all three of the majors in the Division of Resource Economics and Management: Agribusiness Management, Environmental and Energy Resources Management, and Environmental and Natural Resource Economics.

For Agribusiness Management (AM) majors, this capstone experience is 3 to 6 credit hours and generally occurs in the summer prior to his/her last year or semester or during his/her last year or semester. This capstone experience offers each student three options: (1) completion of a professional field experience internship (ARE 491), (2) completion of a senior thesis (ARE 496), or (3) completion of a study abroad experience (ARE 491).

For Environmental and Energy Resources Management majors this capstone experience is an internship that meets a minimum of 5 credit hours (RESM 491) that take place during their junior and/or senior years or in the summer prior to their last year. Environmental and Energy Resources Management majors may use job shadowing for up to 2 credit hours of capstone experience (RESM 491). They may also substitute completion of a study abroad experience (ARE 491) or completion of a senior thesis (ARE 496) for up to 3 credits of the capstone experience.

For Environmental and Natural Resource Economics (ENRE) majors, this capstone experience is 3 credit hours for completion of a senior thesis (ARE 496).

Each student will be responsible for developing his/her own internship, senior thesis, or study abroad experience. Exploration of internship opportunities or senior thesis ideas occurs when the student is enrolled in the seminar class (ARE 494) during the fall semester of his/her junior year. If a student is considering the study abroad option, advance planning of at least one year prior to studying abroad is required in order to be prepared to complete this option. Each proposed internship (ARE 491), senior thesis (ARE 496), or study abroad experience (ARE 491) must be reviewed by the student's undergraduate advisor and the ARE Undergraduate Coordinator prior to registration into the internship or senior thesis course. Each proposed internship or job shadow (RESM 491) must be reviewed by the course instructor prior to registration into the internship course.

Requirements for the Internship Option:

- Work with your advisor to determine an appropriate internship experience given your career goals.
- You must work at least 75 hours at the internship for each WVU credit hour earned. A minimum of 3 credit hours are needed, and a maximum of 6 credit hours are possible for the capstone requirement. A minimum of 5 credit hours is needed for Environmental and Energy Resources Management majors.
- Registration for ARE 491 (internship) requires approval of the Undergraduate Coordinator. Contact Dr. Brown for an internship description form that is required to be filled out for ARE 491. Registration for RESM 491 (internship) requires approval of the course instructor. Contact Mr. Barry Stephens for an internship or job shadow description form that is required to be filled out for RESM 491.
- The credit hours for the internship must be acquired during the semester when all or a portion of the work hours are completed.
- If your internship takes place during the summer, you are required to register for ARE 491 or RESM 491 as an off-campus course. You will register online but first Dr. Brown or Dr. Collins must clear you to be able to do so. *Payment for off-campus courses is per credit hour and possibly will not be covered by financial aid, so plan accordingly.*
- You should retain and may be required to submit pay stubs or another record of your work hours.
- Your supervisor must complete an evaluation form of your internship experience. This form will be sent by Dr. Brown or Mr. Stephens to your internship supervisor using contact information that you provide.
- Two written reports are required to be submitted via eCampus:
 - (1) a one page progress report submitted at about the halfway point of your internship
 - (2) a final report of your internship experience (5-7 pages), including descriptions of your responsibilities, what you learned on the job, what skills/knowledge you applied from your WVU coursework, and how this internship will help your future career goals. (Keeping a daily journal during your internship will help with this.)

Requirements for the Senior Thesis Option:

- Completion of a senior thesis involves independent research by the student under guidance of a faculty member. Students wishing to do a senior thesis project should discuss possible topics with appropriate ARE professors or other faculty at WVU.

- One goal of a senior thesis is for the student to submit a research paper that, with revisions by the faculty advisor, could be submitted for presentation at a professional conference or for publication as a journal article.
- This research should involve development of research objectives and hypotheses, gathering of data (such as a conducting a survey or collecting data from government agencies), doing an appropriate statistical or mathematical analysis of this data, and interpretation of the results.
- Students are expected to submit a research outline and rough draft according to a schedule developed by the supervising faculty member. A final research paper in the range of 30 to 60 pages is required to be submitted to the faculty member supervising the senior thesis and to the student's advisor. This paper will be graded based on the expectations of the supervising faculty member.
- Approval to register for ARE 496 (senior thesis) requires a signed document between the supervising faculty member and the student which adequately states the expectations for this research. Dr. Brown, Undergraduate Coordinator, must receive a copy of this document or notice of completion of this document from the supervising faculty member before you will be cleared to register for this course.

Requirements for the Study Abroad Option:

- The study abroad experience must follow the guidelines established by the WVU Office of International Programs (<http://internationalprograms.wvu.edu/r/download/33661>).
- A student must attend a qualified higher education institution in a foreign country for at least one semester or the entire summer term.
- A student must enroll as a full-time student during their study abroad experience and complete at least 9 credit hours of course work that is transferred to West Virginia University.
- During the study abroad experience, each student is expected to participate in outside classroom activities (seminars, student organizations, field trips, etc.), attend local events, travel, and keep at least a weekly blog of their activities.
- Either during the semester of study abroad or during the semester immediately following his/her return to West Virginia University, each student must register for 3 credits of ARE 491.
- A written report (3-5 pages) and oral presentation (10-15 minutes) on your study abroad experience to fellow students and program faculty must be satisfactorily completed to receive a grade for ARE 491.
- Contact Dr. Brown if you are interested in using the study abroad experience to meet your capstone experience requirement.

Tracking Progress toward Graduation

Using DegreeWorks, students can track their progress toward graduation online. This system is accessed via the DegreeWorks link in STAR. It provides students with instant access to what degree requirements have been met and what requirements still remain. A student should work with his/her academic advisor to make sure that DegreeWorks correctly reflects his/her progress toward graduation. For all majors, a four-year plan of study is provided in this handbook to provide guidance on what needs to be completed for graduation.

Graduation

In order for students to graduate from West Virginia University, they must fulfill three broad requirements: (1) meet the credit hour requirement of the degree (120 hours for Agribusiness Management, Environmental and Energy Resources Management and Environmental and Natural Resource Economics), (2) meet the university requirements of the General Education Foundation (GEF), and (3) meet the requirements of their chosen major as discussed in the degree descriptions of this handbook. Check DegreeWorks and with your academic advisor to verify that all graduation requirements have been met. During a student's last semester at WVU, a student expecting to graduate must complete an application to graduate. This is done online but the Davis College Records office can help you with the graduation application process.

General Education Foundation

The General Education Foundation (GEF) contains eight objectives. Courses that meet GEF requirements are available at the registrar's website: <http://registrar.wvu.edu/gef>. Four courses offered within the ARE program can be used to satisfy GEF requirements (see Table 1).

Table 1. ARE courses that meet GEF objectives.

Course Number and Title	GEF Objective
ARE 150 <i>Intro. Agricultural and Agribusiness Economics</i>	4
ARE 187 <i>Energy Resource Economics</i>	2A
ARE 220 <i>Intro. Environmental and Resource Economics</i>	4
RESM 140 <i>Sustainable Living</i>	7

Within WVU Transfer Information

Both the Agribusiness Management and the Environmental and Natural Resource Economics majors are very receptive to transfer students. With over 50 credit hours of free and restricted electives, most students can easily transfer into either major and not fall behind their graduation schedule. Table 2 contains information about approved substitutions for required courses that are commonly taken by transfer students prior to their entry into either major. With the "What if" option in DegreeWorks, students can determine how their currently completed courses satisfy requirements of any of the three ARE majors.

Table 2. Commonly accepted substitutions for ARE major courses.

Required Course	Approved Substitute
ARE 110	BUSA 202
AGEE 110	CS 101
ARE 150	ECON 201
ARE 401	ECON 301

Restricted Electives

All three majors feature a requirement of restricted electives. Agribusiness Management majors are required to complete 30 hours of restricted electives. Environmental and Energy Resources

Management majors are required to complete 36 hours of restricted electives. Environmental and Natural Resource Economics majors are required to complete 22 hours of restricted electives. Restricted electives are chosen jointly by the advisor and student based on the student's career interests and plans after graduation.

Important Links

DegreeWorks: <http://registrar.wvu.edu/dw>
Ecampus: <http://ecampus.wvu.edu/>
STAR: <http://star.wvu.edu/>
GEF Course List: <http://registrar.wvu.edu/gef>
Schedule of Courses: <http://courses.wvu.edu/>
Minors Description List: <http://catalog.wvu.edu/undergraduate/minors/>
Transferring Courses from other colleges or universities:
http://admissions.wvu.edu/admissions/university-requirements/transfer_equivalency

Agribusiness Management Major

The goal of this major is to provide students with a breadth of knowledge that will prepare them for entry-level management positions or starting their own enterprise in a variety of rural, land-based, agricultural and/or food-related businesses. Students with this major can expect to find employment in: agribusiness (including nursery and landscaping) firms or farms; financial institutions; or state and federal government agencies dealing with land use, food and agriculture. Employment in these areas requires the essential components of this major: a broad educational background combined with knowledge of managing natural resource-based businesses. By selecting appropriate coursework in consultation with their advisor, the flexibility of this major provides students with the opportunity to create their own area of expertise or follow course tracks for entrepreneurship, equine management, food science and technology, horticulture, or livestock, as well as to pursue coursework in preparation for graduate school. A minimum of 120 credit hours are required for graduation in this major.

Course Requirements

Credit Hours

General Education Foundations

- | | |
|--|-----|
| 1. Composition and Rhetoric (ENGL 101 and 102 or ENGL 103) | 3-6 |
| 2. Science and Technology | 4-6 |
| GEF 2A or | |
| GEF 2B | |
| 3. Mathematics and Quantitative Skills | 3 |
| 4. Society and Connections | 3 |
| 5. Human Inquiry & the Past | 3 |
| 6. The Arts & Creativity | 3 |
| 7. Global Studies & Diversity | 3 |
| 8. Focus* | 9 |

Orientation	1
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Required Courses	41
ARE 110, 150 (GEF 4), 204, 360, 382, 421, 431, 461, 482, 484 and 494	
AGEE 110	
ECON 202	
STAT 111 (GEF 3)	

Restricted Electives	30
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The restricted electives must be selected in consultation with the advisor, include at least four courses from the Davis College, and selected from the list below:

Upper-division (300-400 level) courses from the following subjects: ADV, AGBI, AGEE, ARE, AGRN, ANNU, ANPH, ANPR, A&VS, AEM, BIOL, COMM, DSGN, ECON, ENLM, ENTO, ENTR, ENVP, FIN, FDST, FMAN, FOR, GEOG, GEOL, HORT, HN&F, LARC, LDR, PLSC, POLS, PSYC, PR, RPTR, RESM, SOCA, WMAN, WGST, and WDSC.

STAT at 200-level or higher.

AGEE 220 Group Organization and Leadership

AGRN 202 & AGRN 203 Principles of Soil Science and Principles of Soil Science Laboratory

ARE 220 Introductory Environmental and Resource Economics
ANNU 260 Animal Nutrition
A&VS 251 Principles of Animal Science
A&VS 281 Introduction to Equine Care and Use
DSGN 280 Sustainable Design and Development
FDST 200 Food Science and Technology
HORT 220 General Horticulture
MATH 150 Applied Calculus
PLSC 206 Principles of Plant Science
POLS 210 Law and the Legal System

University Capstone Course Requirement (ARE 491 or 496)	3
Free Electives*	17
Total	120

*Some restricted or free electives may also be counted in GEF 8 (Focus). Number of free electives may vary depending on courses chosen throughout your university career.

Recommended Academic Schedule of Courses for the Agribusiness Management Major

Year 1

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 150 (GEF 4)	3	AGEE 110	3
ENGL 101 (GEF 1)	3	GEF 5, 6, or 7	3
GEF 2B (BIOL 101 & 103)	4	GEF 5, 6, or 7	3
GEF 5, 6, or 7	3	Free Elective	3
WVUE 191 (Orientation)	1	STAT 111 (GEF 3)	3
Credit hours	14	Credit hours	15

Year 2

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 110	3	ECON 202	3
ARE 204	3	GEF Focus Course	3
ENGL 102 (GEF 1)	3	Restricted elective	3
Restricted elective	3	Restricted elective	3
Free elective	3	Free elective	3
Credit hours	15	Credit hours	15

Year 3

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 360	3	ARE 431	3
ARE 382	3	ARE 461	3
ARE 494	1	ARE 482	3
Restricted elective	3	Restricted elective	3
Restricted elective	3	GEF Focus Course	3
GEF Focus Course	3	Free elective	1
Credit hours	16	Credit hours	16

SUMMER: ARE 491 (University Capstone - 3 credit hours)

Year 4

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 421	4	ARE 484	3
Restricted elective	3	Restricted elective	3
Restricted elective	3	Restricted elective	3
Free elective	3	Free elective	4
Credit hours	13	Credit hours	13

Environmental and Energy Resources Management Major

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. The program emphasizes the core components of both business and STEM (science, technology, engineering and math) learning in its curriculum.

Upon completion of this degree, students are expected to understand how to coordinate the management of these resources across regulatory, institutional and socioeconomic structures. Some students, upon completion of this degree, may find it desirable to obtain a graduate degree to further expand their career opportunities.

Course Requirements

Credit Hours

General Education Foundations

- | | |
|---|-----|
| 1. Composition and Rhetoric (ENGL 101 and 102 or ENGL 103) | 6 |
| 2. Science and Technology
GEF 2A or
GEF 2B (BIOL 101 & 103) | 4-6 |
| 3. Mathematics and Quantitative Skills (MATH 150) | 3 |
| 4. Society and Connections (ARE 220) | 3 |
| 5. Human Inquiry & the Past | 3 |
| 6. The Arts & Creativity | 3 |
| 7. Global Studies & Diversity | 3 |
| 8. Focus* | 9 |

Orientation	1
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Required Courses	35
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ARE 187, 199, 201, 382, 421, and 445
ECON 202; PHYS 101; PLSC 206;
RESM 440 and 441 *or* 442, 480, and 494

University Capstone Course Requirement (RESM 491)	5
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Restricted Electives*	36
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Selected and approved in consultation with advisor. Must include at least three courses from each of the four restricted elective categories: Economics, Energy, Entrepreneurship, and Environment. See Restricted Electives List on page 14.

Free Electives*	7-9
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Total	120
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*Some restricted or free electives may also be counted in GEF 8 (Focus). Number of free electives may vary depending on courses chosen throughout your university career.

Recommended Academic Schedule of Courses for the Environmental and Energy Resources Management Major

Year 1

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 187	3	ARE 150 (GEF 4)	3
BIOL 101 & 103 (GEF 2B)	4	PLSC 206	4
ENGL 101 (GEF 1)	3	GEF 5, 6, or 7	3
MATH 150 (GEF 3)	3	GEF 5, 6, or 7	3
WVUE 191 (Orientation)	1	Free Elective	3
Credit hours	14	Credit hours	16

Year 2

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 199	1	ARE 201	3
ARE 204 (<i>Entrepreneurship</i>)	3	ECON 202	3
ARE 220 (<i>Economics</i>)	3	GEF 5, 6, or 7	3
ENGL 102 (GEF 1)	3	GEF Focus Course	3
PHYS 101	4	Free Elective	3
Credit hours	14	Credit hours	15

Year 3

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 382	3	ARE 445	3
DSGN 340 (<i>Energy</i>)	3	ARE 431 (<i>Entrepreneurship</i>)	3
ENGR 310 (<i>Energy</i>)	3	ENVP 415 (<i>Environment</i>)	3
GEOG 205 (<i>Environment</i>)	3	RESM 480	3
RESM 440	2	GEF Focus Course	3
RESM 441 or 442	2		
Credit hours	16	Credit hours	15

SUMMER: RESM 491 (University Capstone - 5 credit hours)

Year 4

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 421	4	ARE 410 (<i>Economics</i>)	3
ECON 302 (<i>Economics</i>)	3	ARE 482 (<i>Entrepreneurship</i>)	3
GEOG 207 (<i>Environment</i>)	3	RESM 450 (<i>Energy</i>)	3
RESM 494	1	GEF Focus Course	3
Free Electives	3		
Credit hours	14	Credit hours	12

Restricted Electives List:

1. Economics (minimum of 3 courses)

- ARE 220 Introductory Environmental and Resource Economics.
ARE 401 Applied Demand Analysis or ECON 301 Intermediate Micro-Economic Theory
 (PR: ARE 150 or ECON 201)
ARE 410 Environmental and Resource Economics
 (PR: ARE 401 or ECON 301 or consent)
ARE 450 Agricultural, Environmental & Resource Policy
 (PR: ARE 401 or ECON 301 or consent)
ECON 302 Intermediate Macroeconomic Theory
 (PR: ARE 150 or ECON 201 and ECON 202)

2. Energy (minimum of 3 courses)

- DSGN 340 Design for Energy Efficiency
DSGN 470 LEED Green Building Systems
 (PR: DSGN 280)
ENGR 310 Energy Engineering
RESM 450 Land Use Planning Law
WDSC 444 Bio-Based Energy Systems

3. Entrepreneurship (minimum of 3 courses)

- AGEE 421 Agricultural and Natural Resource Communications
ARE 204 Agribusiness Management or BUSA 320 Survey of Management
ARE 431 Marketing Agricultural Products or BUSA 330 Survey of Marketing
ARE 461 Agribusiness Finance or BUSA 340 Survey of Finance
ARE 482 Enterprise Operation Law

4. Environment (minimum of 3 courses)

- AGRN 455/ENVP 455 Reclamation of Disturbed Soils
ENVP 355 Environmental Sampling and Analysis
 (PR: BIOL 101 & 103 and BIOL 102 & 104 and CHEM 115 and CHEM 116)
ENVP 415 Hazardous Waste Training
ENVP 460 Environmental Impact Assessment
 (PR: BIOL 101 & 103 and BIOL 102 & 104 and CHEM 115 and CHEM 116)
GEOG 205 Natural Resources
GEOG 207 Climate and Environment
GEOG 415 Global Environmental Change
 (PR: GEOG 107 or equivalent or consent)
WMAN 200 Restoration Ecology

Environmental and Natural Resource Economics Major

The objective of this major is to provide students with the necessary training for the application of economic theory and analysis to environmental and natural resource issues. The flexibility of this major allows students to design (with their advisor) a program of study which focuses on environmental and natural resource issues tailored to the student's own interests (such as water use and quality, soil protection, waste management, ecosystem management, and land use). The curriculum reflects the breadth of training required to prepare students for careers in private and government sectors dealing with environmental and natural resource management and policy analysis.

Students with this major can expect to find employment with state and federal government agencies or with private industry in environmental policy analysis and management of natural resources. Many students, upon completion of this degree, may find it desirable to obtain a graduate degree to expand their career opportunities. Students completing this degree will be prepared for graduate study in environmental and natural resource economics and policy.

Course Requirements	Credit Hours
General Education Foundations	
1. Composition and Rhetoric (ENGL 101 and 102 or ENGL 103)	3-6
2. Science and Technology (must include four credit hour course with a lab)	4
3. Mathematics and Quantitative Skills	3
4. Society and Connections	3
5. Human Inquiry & the Past	3
6. The Arts & Creativity	3
7. Global Studies & Diversity	3
8. Focus (ARE 187 & ENVP 155 & four credit hour science course with a lab)	10
Orientation	1
Required Courses	44
ARE 150 (GEF 4), 187 (GEF 8), 220, 382, 410, 445, 450, 494 AGEE 110 ECON 202, 225, 301, 302, 421 and 425 MATH 150 or MATH 153 & 154 or MATH 155 RESM 440, 442 and 480	
Restricted Electives	22
AGRN 202 & AGRN 203 Selected and approved in consultation with advisor, student must select either an approved minor or at least four courses at the 300 or 400 level – either from Agronomy (AGRN), Agricultural and Resource Economics (ARE), Economics (ECON), Environmental Protection (ENVP), Forest Management (FMAN), or Forestry (FOR).	
University Capstone Course Requirement (ARE 496)	3
Free Electives	13
Total	120

Recommended Academic Schedule of Courses for the Environmental and Natural Resource Economics Major

Year 1

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 187 (GEF 8)	3	AGEE 110	3
ENGL 101 (GEF 1)	3	ARE 150 (GEF 4)	3
MATH 126 (GEF 3)	3	ECON 225	3
WVUE 191 (Orientation)	1	ENVP 155 (GEF 8)	3
GEF 2B (BIOL 101 & 103)	4	GEF 5, 6, or 7	3
Semester Total	14	Semester Total	15

Year 2

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 220	3	AGRN 202 & 203 (Restricted Elec)	4
ENGL 102 (GEF 1)	3	GEF 5, 6, or 7	3
MATH 150	3	GEF 5, 6, or 7	3
ECON 202	3	Restricted Elective	3
GEF 8 (CHEM or GEOL)	4	Free Elective	3
Semester Total	16	Semester Total	16

Year 3

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
ARE 382	3	ARE 445	3
ARE 494	1	ECON 302	3
ECON 301	3	RESM 480	3
ECON 421	3	ARE 440 (Restricted Elective)	3
Restricted Elective	3	Free Elective	3
Free Elective	3		
Semester Total	16	Semester Total	15

Year 4

FALL	Cr. Hrs.	SPRING	Cr. Hrs.
RESM 440	2	ARE 410	3
RESM 442	2	ARE 450	3
ENVP 355 (Restricted Elective)	3	ARE 496 (Senior Thesis: Capstone)	3
Restricted Elective	3	ECON 425	3
Restricted Elective	3	Free Elective	3
Free Elective	1		
Semester Total	13	Semester Total	15

Undergraduate Courses

Agricultural and Resource Economics (ARE)

110. *Agribusiness Accounting*. Fall. 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.)

150. *Introductory Agricultural and Agribusiness Economics*. Fall & Spring. 3 Hours. Introduction to basic agricultural economics and agribusiness concepts, and the application of these concepts to agricultural and agribusiness issues.

187. *Energy Resource Economics*. Fall. 3 Hours. Introduction to fossil and renewable sources of energy; the effects of energy use on the environment; and relationships between energy, politics, and economic development.

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

201. *Principles of Resource and Energy*. Spring. 3 Hours. 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.

204. *Agribusiness Management*. Fall. 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.

220. *Introductory Environmental and Resource Economics*. Fall & Spring. 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.

293A-Z. *Special Topics*. 1-6 Hours. Investigation of topics not covered in regularly scheduled courses.

360. *Current Issues in Agriculture*. Fall. 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. This course also meets the university writing requirement.

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.

382. *Agricultural and Natural Resources Law*. Fall. 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 statutes are enacted, administered and enforced.

401. *Applied Demand Analysis*. Fall. 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.

402*. *Applied Production Economics*. 3 Hours. 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*. Spring. 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.

410. *Environmental and Resource Economics*. Spring. 3 Hours. PR: ARE 401 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*. Spring. 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.

421. *Rural Enterprise Development*. Fall. 4 Hours. PR: ARE 204 and ARE 110, 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*. Spring. 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.

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

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

445. *Energy Economics*. Spring. 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.

450. *Agricultural, Environmental and Resource Policy*. Spring. 3 Hours. PR: ARE 401 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 costs of alternative policies.

461. *Agribusiness Finance*. Spring. 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.

482. *Enterprise Operation Law*. Spring. 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.

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

491. *Professional Field Experience: Capstone*. 3-6 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.

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

494. *Seminar, Career Development*. Fall. 1 hr. PR: Junior standing. Development of career goals and job search skills. Investigation of topics that advance students in their career goals.

495. *Independent Study*. 1-6 Hours. PR: Consent. Faculty supervised study of topics not available through regular course offerings.

496. *Senior Thesis: Capstone*. 3 Hours. PR: Consent. Student research supervised by a faculty member that results in an academic paper.

*This course is not taught on a regular basis.

Resource Management (RESM)

140. *Sustainable Living*. Fall. 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.

293A-Z. *Special Topics*. 1-6 Hours. Investigation of topics not covered in regularly scheduled courses.

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

420*. *Aquaculture Management*. 3 hr. PR: BIOL 101 and 103 or equiv. Lectures, field trips, demonstrations, and discussion are used to demonstrate interdisciplinary application of science and economics to production of recreational or food fish.

440. *Foundations of Applied GIS*. Fall. 2 hr. 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.

441. *Introduction to GIS Natural Sciences*. Fall. 2 hr. Using Geographic Information Systems (GIS) to solve problems in environmental and natural resource management, taken concurrently with RESM 440.

442. *Introduction to GIS Social Sciences*. Fall. 2 hr. Using Geographic Information Systems (GIS) to solve problems in the social sciences, taken concurrently with RESM 440.

450. *Land Use Planning Law*. Spring. 3 hr. 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.

455. *Practice of Land Use Planning*. Fall. 3 hr. 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.

480. *Environmental Regulation*. Spring. 3 hr. This course covers the legal aspects of environmental protection including laws and regulations dealing with water, air, hazardous waste, and land use.

491. *Professional 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.

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

495. *Independent Study*. 1-6 Hours. PR: Consent. Faculty supervised study of topics not available through regular course offerings.

*This course is not taught on a regular basis.

ARE Faculty Members

Cheryl Brown, Ph.D. University of California, Berkeley Cheryl.Brown@mail.wvu.edu

Dr. Brown serves as Undergraduate Coordinator and teaches agricultural, environmental and natural resource policy, marketing agricultural products, sustainable living, and career development at the undergraduate level. She advises undergraduates in the Agribusiness Management major. Her research interests focus on multiple aspects of agricultural sustainability, including organic and direct marketing, land use and pesticide policies, local and regional food system development, and the impacts of the food system on health.

Alan R. Collins, Ph.D. Oregon State University Alan.Collins@mail.wvu.edu

Dr. Collins is Graduate Coordinator and an undergraduate advisor for the major in Environmental and Natural Resource Economics. He teaches sustainable living and classes in environmental and natural resource economics at both the undergraduate and graduate levels. His research interests include: economic incentives of water quality improvement (including water quality trading), and agricultural waste management.

Gerard E. D'Souza, Ph.D. Mississippi State University Gerard.D'souza@mail.wvu.edu

Dr. D'Souza is the Division Director and has taught undergraduate classes in introductory agricultural and agribusiness economics and agribusiness finance. He advises undergraduate students in the Agribusiness Management major. His research area of interest is sustainable development with a focus on natural resource use in agriculture.

Levan Elbakidze, Ph.D. Texas A&M University Levan.Elbakidze@mail.wvu.edu

Dr. Elbakidze joined the ARE faculty in fall 2015. His research interests revolve around management of natural resources including water, shale gas, land, invasive species, and energy. His research projects primarily rely on advanced empirical tools including mathematical and econometric models often times in interdisciplinary contexts. His teaching interests include natural resource economics and empirical modeling of bioeconomic and industrial systems.

Xiaoli Etienne, Ph.D. University of Illinois Xiaoli.Etienne@mail.wvu.edu

Dr. Etienne joined the ARE faculty in fall 2014. Her teaching interests include commodity futures markets, price analysis, and introductory microeconomics. Her research applies advanced econometric methods to address a number of important questions related to agricultural and energy economics.

Jerald J. Fletcher, Ph.D. University of California, Davis Jerry.Fletcher@mail.wvu.edu

Dr. Fletcher teaches graduate courses and is involved in projects that relate to energy and valuing non-market, environmental, and recreation-related resources.

Tesfa G. Gebremedhin, Ph.D. Oklahoma State Univ. Tesfa.Gebremedhin@mail.wvu.edu

Dr. Gebremedhin teaches undergraduate courses in agribusiness management, introductory agricultural economics, and rural economic development. At the graduate level, he teaches research methods and rural and regional development. His research interests include rural and community development, emphasizing rural employment, income, poverty, education, and small farms.

Tim T. Phipps, Ph.D. University of California, Davis Tim.Phipps@mail.wvu.edu

Dr. Phipps is serving as an Associate Dean in the Davis College and Associate Director of the WV Agriculture and Forestry Experiment Station. His areas of expertise include agricultural policy, the relationship between agricultural production and environmental quality, land-use policy, resource and environmental economics, and applied econometrics.

Peter V. Schaeffer, Ph.D. University of Southern California Peter.Schaeffer@mail.wvu.edu

Dr. Schaeffer teaches applied demand analysis at the undergraduate level and a doctoral-level regional economics course. His research interests are in regional and labor economics, particularly labor migration and job mobility.

Doolarie Singh-Knights, Ph.D. West Virginia University DoSingh-Knights@mail.wvu.edu

Dr. Singh-Knights has an appointment in Agricultural and Resource Economics as well as being an Extension Specialist in the area of Agriculture and Natural Resources. She teaches classes in livestock marketing and agribusiness accounting and advises undergraduate students in the Agribusiness Management major. Her research interests include: production economics, marketing alternatives for small livestock, and farm management decision making.

Dennis K. Smith, Ph.D. Pennsylvania State University Denny.Smith@mail.wvu.edu

Dr. Smith is Associate Dean for Student Success in the Davis College of Agriculture, Natural Resources and Design. His interests are focused on U.S. rural economic development with emphasis on rural employment change, agricultural business development and marketing.

Mark Sperow, Ph.D. Colorado State University Mark.Sperow@mail.wvu.edu

Dr. Sperow teaches agricultural production economics at the graduate level along with courses related to agricultural production, economic theory, and natural resources at the undergraduate level. He advises undergraduates in the Environmental and Natural Resource Economics major. His research interests include global warming mitigation, carbon sequestration, simulation modeling, impacts of agricultural policy, and crop management and production decisions.

Heather Stephens, Ph.D. Ohio State University Heather.Stephens@mail.wvu.edu

Dr. Stephens joined the ARE faculty in fall 2015. Her areas of expertise include resource, energy, and regional economics.

Mike Strager, Ph.D. West Virginia University Michael.Strager@mail.wvu.edu

Dr. Strager specializes in the use of geospatial technologies as tools in the management of natural resources. He teaches classes that cover geographic information systems, remote sensing, global positioning systems, quantitative methods and spatial analysis. He advises students in the Environmental and Energy Resources Management major. His interdisciplinary research interests include ecological and economic modeling to support decision making and policy.