

Graduate Program Handbook 2005-2006

**Agricultural & Resource Economics Program
Division of Resource Management
Davis College of Agriculture, Forestry and Consumer Sciences
West Virginia University**

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Students visiting at Resources for the Future (RFF)
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I. INTRODUCTION

Agricultural and Resource Economics (ARE) is an applied economics program which deals with the analysis and understanding of natural resources, environmental, agricultural, rural development, and international agricultural and resource issues. Training in the area broadens intellectual horizons and helps prepare students for a variety of professional careers in business, government, and academia. Agricultural and resource economists work in a wide range of activities including agricultural production and marketing, business management, consumer analysis, natural resource management, environmental assessment, energy economics, policy analysis, international trade, and economic development.

The **ARE** Faculty offers graduate programs leading to the Master of Science (M.S.) degree in Agricultural and Resource Economics and the Doctor of Philosophy (Ph.D.) degree. The Ph.D. degree program is in Resource Management and Sustainable Development¹ which includes two options: Natural Resource Economics (NRE) and Resource Management (RM). These programs are designed to provide both a required core of course work for advanced training in the field and the flexibility to meet individual student needs. All graduate programs in the Davis College of Agriculture, Forestry and Consumer Sciences are administered under the direction of the Associate Dean for Academic Affairs.

The purpose of this handbook is to outline procedures and requirements for obtaining graduate degrees in agricultural and resource economics. The policy statement contained here provides a summary of the procedures applicable to students enrolled in the *ARE* graduate program. It should be noted that the *Graduate Catalog* of West Virginia University contains the official rules and regulations for graduate study (a copy of the *Graduate Catalog* can be obtained on request from the WVU Office of Admissions and Records or from <http://coursecatalog.wvu.edu/fullcatalogs/gradcat.pdf>) This handbook is designed to help clarify those procedures; it does not supersede or negate them. **It is the responsibility of each student to learn and conform to the official University, College, Division, and Program procedures and requirements.**

II. ADMISSION PROCESS

1. Admission Requirements

a) University Requirements

¹ The Division of Resource Management offers graduate studies leading to the degree of Ph.D. in Resource Management and Sustainable Development. This doctoral program offers four majors: Natural Resource Economics (NRE), Resource Management (RM), Agricultural and Extension Education (AEE), and Human and Community Development (HCD). NRE and RM are offered by the Agricultural and Resource Program. AEE is offered by Agricultural and Environmental Education Program. HCD is an interdisciplinary major offered by the programs in the Division of Resource Management.

Admission as a regular graduate student requires a baccalaureate degree from an accredited college or university, a 2.75 grade point average (GPA) based on a 4.0 scale, plus any specific program course requirements. Students not meeting all program requirements may be admitted on a provisional or on a non-degree basis. International students whose native language is not English must take the Test for English as a Foreign Language (TOEFL) and achieve a test score of at least 213 (550 under the old grading system).

b) Davis College of Agriculture, Forestry and Consumer Sciences Requirements

In addition to the University requirements, the Davis College of Agriculture, Forestry and Consumer Sciences requires that applicants take the Graduate Records Examination (GRE) with scores adequate to demonstrate an aptitude for graduate study, provide three (3) letters of reference, and submit a statement of 500 words or more indicating the applicant's goals and objectives for graduate study.

c) Agricultural and Resource Economics Requirements

M.S. Program

In addition to the University and College requirements, applicants to the *ARE* M.S. program must have twelve or more semester hours of credit in economics, agricultural economics, statistics, or appropriate social science courses. These courses must include a course in intermediate microeconomics, three or more semester hours of credit in calculus, and three or more credit hours of elementary or higher-level statistics. The student must have a grade point average of at least 2.75 for all credit in economics and agricultural/resource economics courses.

Ph.D. Program

In addition to the University and Davis College requirements, applicants to the Ph.D. program in Resource Management and Sustainable Development, with the exception noted below, must have an M.S. degree, have earned a GPA of 3.0 or higher in graduate courses and have GRE scores that sum to at least 1000 (verbal and quantitative combined) and a minimum score of 3.0 for the analytical writing section. Students who do not meet all of the above requirements can be admitted on a provisional basis. Students with exceptional undergraduate records and strong quantitative backgrounds and economic theory can be admitted directly from B.S. or B.A. programs.

2. Application to the Program

An individual wishing to pursue a graduate degree in the *ARE* program must use the appropriate application form which can be obtained from the WVU Office of Admissions and Records, the Division or College main office, the *ARE* Graduate Program Coordinator, or on the web at <http://www.arc.wvu.edu/admissions/applications.html>. U.S.

citizens and permanent residents use the "Application for Graduate Admission" while international students use the "International Students Admission Application."

Applicants should complete and submit the appropriate form together with (a) the required supporting documents (these include official transcripts of all undergraduate and previous graduate studies, curriculum vita, three letters of reference, personal statement describing research interests and professional aspirations, GRE test scores, and, for foreign students whose native language is not English, TOEFL examination results), and (b) the \$55 application fee to the WVU Office of Admissions and Records, which will process, check, and then send the application package to the Davis College of Agriculture, Forestry and Consumer Sciences which, in turn, forwards the package to the Division of Resource Management. The *ARE* Graduate Admissions Committee, comprised of the Graduate Program Coordinator and three or more program faculty, evaluates the application and recommends whether the applicant is to be accepted and the type of admission (regular or provisional as explained below). The Director of the Division of Resource Management and the Associate Dean for Academic Affairs act upon that recommendation. The Office of Admission and Records notifies the applicant of the action.

The application is for a specific semester or summer term and the applicant is expected to report to WVU to begin his/her program of study by the date specified in the notice of acceptance. The applicant must request a delay if he/she wishes to start at a date later than specified in his/her original application. If this request is for a delay of one year or more the student must reapply and pay the application fee again.

3. Types of Admission

Regular: A regular graduate student is a degree-seeking student who meets all the criteria for regular admission to the applicable program and who has no deficiencies to make up.

Provisional: An applicant may be admitted as a provisional student when he/she does not meet all of the criteria for regular admission. The student may have incomplete credentials, course deficiencies to make up, or an undergraduate scholastic record with less than the required grade-point average, but which shows promise.

Non-Degree: A non-degree graduate student is a student admitted to the Davis College of Agriculture, Forestry and Consumer Sciences but not admitted to any specific program within the College. Admission as a non-degree student does not guarantee admission to any course or program. Reasons for non-degree admission may be late application, incomplete credentials, scholarship deficiencies, or lack of a degree objective. Even though a non-degree student has not been admitted to a graduate program, a program unit may allow a non-degree student to enroll in its courses. To be admitted as a non-degree student, a student must not only present evidence of a baccalaureate degree and a 2.50 GPA, but must also obtain at least a 2.50 GPA on the first 12 credit hours of course work and maintain this average or better as long as enrolled as a non-degree student. To be

eligible to enter a degree program, the student must obtain a minimum of a 2.75 grade-point average on all course work taken since admission as a graduate student. The non-degree program is administered by the Associate Dean for Academic Affairs of the Davis College of Agriculture, Forestry and Consumer Sciences. Application for admission into an *ARE* Graduate Program from non-degree status will be evaluated by the Program's Graduate Admissions Committee.

III. GRADUATE STUDENT EMPLOYMENT

1. Graduate Research Assistantships

We offer a limited number of Graduate Research Assistantships (GRAs) each year, which consist of a stipend plus a waiver of tuition. Current 9-month stipends are \$8,100 for M.S. students and for Ph.D. students it ranges from \$11,700 (starting the program) to \$14,400 (after passing the comprehensive and field exams). GRAs are awarded on a competitive basis. University policy stipulates that, other things equal, preference in the award of these assistantships (as well as the partial tuition waivers described in section IV below) be given to domestic applicants. GRAs are required to work 20 hours per week on an approved research project under faculty supervision. During the first year the GRA will be assigned to a faculty member who will determine the research tasks and supervise the student. Generally, the student's major professor is also the GRA supervisor. Work on a GRA may be used for developing the student's thesis or dissertation. However, the work assignment given to a GRA, especially during the first year, might **not** be applicable to thesis research. GRAs are limited to a total of 24 months for the M.S. degree and 48 months for the Ph.D. (36 months for the Ph.D. if they were previously employed as a GRA in the *ARE* program). Recipients are expected to be enrolled as full-time students during both the academic year and summer terms (if they are employed as GRAs during the summer) and to complete the degree requirements within that time period. The GRA is expected to contribute to the development of a research publication from the work performed. Students holding a GRA may not be employed elsewhere in the University and may not accept employment outside of the University without permission from their advisor and the Division Director.

Applications for a GRA are made to the Division of Resource Management on forms available from the Division office or the *ARE* Graduate Program Coordinator.

The holder of a GRA must at all times maintain a GPA of at least 3.3 to remain eligible for the assistantship. Failure to do so or failure to comply with the work requirement attached to the assistantship can result in termination of the assistantship.

2. Other Employment

A graduate student not holding a position as a GRA may be employed by the Division of Resource Management as a student worker on an hourly or other basis, subject to availability of funds and faculty needs.

IV. FINANCIAL ASSISTANCE

A limited number of partial tuition waivers are available, with the waivers awarded on the basis of merit and need. These waivers are for a maximum of eight credit hours per student per semester. Other financial assistance opportunities may be available through the University's Financial Aid Office. A listing of the different categories of financial aid and employment available to graduate students through the University is contained in the *WVU Graduate Catalog*.

V. GRADUATE PROGRAM PROCEDURES

A student who has been admitted to the graduate program reports to the Graduate Program Coordinator in Agricultural and Resource Economics. The Graduate Coordinator will serve as the student's advisor for registration until such time as the student selects a major professor or has one assigned.

1. Major Professor

Each student must be assigned to a major professor. The student, Graduate Program Coordinator, Division Director and faculty member involved determine the major professor jointly. The major professor must be a member of the *ARE* faculty and a regular member of the WVU graduate faculty. **It is the student's responsibility to ensure that the major professor is selected or assigned prior to pre-registration for the second term of study in the case of M.S. students and by the end of the first academic year for Ph.D. students.**

2. Graduate Committee

The student and his/her major professor will select the remainder of the Graduate Committee. A majority of the Committee must be regular members of the Graduate Faculty and a majority also must be from the *ARE* program faculty.

M.S. Program: The graduate committee consists of a minimum of three persons (a chair and two additional members) for the M.S. degree program. One member can be from an area other than Agricultural and Resource Economics.

Ph.D. Program: The graduate committee consists of a minimum of five persons (a chair and four additional members). At least one member of a Ph.D. student's graduate committee **must** be a faculty member from outside the *ARE* program.

3. Registration Requirement

Normally a student is expected to register for a full course load. (A graduate student is classified as full-time if that student is enrolled for a minimum of 9 hours per semester and 6 hours altogether in the summer, although summer enrollment is optional except for graduate research assistants). Students using any University facilities must be registered

for at least one credit hour. In addition, the student must be registered during the term he/she is to receive the degree. Details on registration requirements, time limits for degree completion, etc. can be found in the *WVU Graduate Catalog*.

Beyond taking courses, graduate students at WVU are also expected to participate in such academic affairs of the University as lectures presented by visiting scholars, scholarly discussions with faculty and fellow graduate students, and in a seminar course (ARE 696) throughout their graduate career (*WVU Graduate Catalog*). Further, it is recognized that Graduate education, especially at the doctoral level, involves many learning experiences which take place outside the formal classroom setting (*Graduate Catalog*). Toward this end, the program organizes such activities as brown bag lunches and occasional seminars during regular semesters. These are open to all graduate students and faculty. In addition, the Economics Department and Regional Research Institute on campus also present seminar series that are of interest to applied economists. Announcements for these and other events (including grant and scholarship opportunities) are posted periodically on the *ARE* bulletin board, located adjacent to Room 2023 AS (the College Microcomputer teaching lab). Incidentally, separate folders containing (a) pertinent job descriptions, and (b) scholarship and assistantship opportunities open to *ARE* graduate students are also available (in Room 2003 AS).

4. Office Space and Facilities

Office assignments are made by the *ARE* program chair. While space is limited, and students on a research assistantship receive priority for office assignments, all graduate students can request and, in most cases expect to be assigned, office space. Often, especially for entering students, this will involve cubicle space in Room 2101 of the Agricultural Sciences (AS) Building (where the *ARE* program is housed), or in the AS Annex. In other cases, students are generally housed three or four to an office.

Our goal is to equip all graduate student offices with one or more microcomputers with web, e-mail, and printer access through a network. Graduate students also have access to computers at the College Microcomputer lab and selected other labs throughout campus. Upon enrollment, students automatically receive an e-mail address through the University; however, students first have to activate their address before they can use it. The Division of Resource Management Office Manager provides students with office and building keys. All graduate students are also assigned a mailbox (currently these, together with a copying machine operated by graduate students for graduate students, are housed in Room 2003 AS Building).

VI. DESCRIPTION OF GRADUATE PROGRAMS

A. MASTER OF SCIENCE PROGRAMS

The M.S. programs provide advanced training in the areas of natural resource, environmental, agricultural, mineral, energy, agribusiness, international, and rural development economics. The primary objective of this program is to prepare students for

further graduate study and a wide variety of careers in business and government. A candidate for the degree must comply with University, College, and Program requirements. The M.S. degree in *ARE* can be obtained under two options, course work or thesis.

Course Work Option: A minimum of 36 hours of approved course work to provide proficiency in economics and resource and agricultural economics is required. Courses in closely related areas may be included if approved by the student's Graduate Committee. To familiarize students with the research process, a supervised research paper, while optional, is recommended under this option. The latter can be accomplished under the *ARE 695 (Independent Study)* or *RESM 691 (Advanced Study)* course designation.

Two-Year Thesis Option: A minimum of 30 credit hours of approved course work to include not more than 6 hours of credit for the thesis, and enough courses to provide proficiency in economics and resource and agricultural economics. Courses in closely related areas may be included. The student's Graduate Committee must approve the student's plan of study and thesis topic using the appropriate form as described below. The thesis topic must also be approved by the Division Director. **The thesis should be based on an approved, written research proposal, formally presented and defended by the student to his or her graduate committee in an open seminar.** After completion of the thesis, an oral defense is scheduled.

1. Plan of Study

Students are expected to formulate a written study plan at the earliest possible date. The plan should include all the specified core courses, and specify all additional classes the student plans to take to fulfill the degree requirements. Each candidate's Plan of Study is developed by the student in consultation with his/her Major Professor and Graduate Committee. Normally, the Plan of Study will comprise graduate-level courses in economic theory and quantitative methods (including both econometrics and optimization) from the *ARE* and Economics programs. **It should be developed prior to pre-registration for the second term of study and must be approved by the student, his/her Graduate Committee, the Director of the Division of Resource Management, and the Associate Dean for Academic Affairs of the College of Agriculture, Forestry and Consumer Sciences.**

The blue Plan of Study form should be used for this purpose, a hard copy and/or disk copy of which can be obtained from the *ARE* Program Secretary, among others.

2. Standards of Achievement

A minimum grade-point average of 3.0 is required for all graduate credit courses taken as part of the approved program for the degree. This includes graduate credit transferred and graduate credit accumulated while pursuing a degree in the *ARE* program. Persons requesting transfers of graduate credit must obtain approval of their Graduate Committee and the Graduate Program Coordinator for such transfers.

3. Examinations

Two-Year Thesis Option: The requirement for the thesis option M.S. is satisfactory completion of an oral examination and, at the discretion of the student's graduate committee, a written examination. The examination(s) can cover any material relevant to the student's program and thesis.

Course Work Option: Obtaining an M.S. with the course work option requires satisfactory completion of *both* a written and an oral examination. These examinations are to cover **all** subject matter relevant to the student's program of study.

The final or oral examinations are conducted by the student's graduate committee. The oral exam is open for attendance by all faculty in the program. The major professor notifies the Associate Dean of the College and *ARE* faculty of the time, place, and location of the final examination. All faculty may attend and participate in the examination, but only the Graduate Committee members may vote on acceptability of the examination results. The final examination may not be taken until the semester or summer session in which all other requirements for the degree are to be met. The student's major professor must indicate on a prepared form (the Request for Shuttle Sheet), in advance, the time, place, and recommended examining committee members and receive clearance from the office of the Associate Dean for Academic Affairs of the Davis College of Agriculture, Forestry and Consumer Sciences before the examination can be given.

The student cannot be considered as having satisfactorily passed the final examination if there is more than one unfavorable vote among members of the examining committee. Results of each examination must be reported (using the Shuttle Sheet) to the Associate Dean for Academic Affairs of the Davis College of Agriculture, Forestry and Consumer Sciences within 24 hours of its completion. Re-examination may not be scheduled without approval of the request by the Associate Dean. All committee members must be present for the final examination. If an examination cannot be scheduled at a time convenient to all committee members, the dean or his/her designee may permit another faculty member to substitute for an original committee member. However, there can be no substitute for the major professor. Only one substitute is allowed, and the request for a substitute must be made in writing well in advance of the examination. The request for a substitute should be signed by the major professor, the student, and both the original faculty member and the substitute faculty member (with approval by the *ARE* Graduate Program Coordinator). A substitute faculty member must have the same or higher graduate faculty status as the original faculty member and represent the same academic discipline or specialization. Two failures of the final exam constitutes grounds for removal from the program.

4. Thesis Requirements

If the requirements for the master's degree include a thesis, the **thesis must bear the original signatures of the committee members**. Only one Committee Member's

signature may be missing. If more than one member of the committee, whatever the size of the committee, dissents from approving the thesis, the degree cannot be recommended. If a substitute faculty member attends the final examination (which includes, but is not necessarily limited to, the thesis defense), the substitute signs the “shuttle sheet”; however the original committee member must sign the thesis. Theses must (a) conform to written University thesis guidelines (available on request from, among others, the *ARE Graduate Program Coordinator*), (b) follow a consistent style (e.g., that reflected in the major disciplinary professional journals or a widely used manual such as the *University of Chicago Manual of Style: A Manual for Authors* published by the American Mathematical Society), and (c) be presented to the University Library at least one week before the degree is expected to be granted.

5. Curriculum and Courses

Each of the M.S. programs is made up of core courses taken by all students and elective courses as approved by the student's committee.

6. Core Classes in the Course Work and Thesis Options:

There is an economic theory requirement and a quantitative requirement with a minimum of six (6) hours to satisfy each requirement. The theory requirement must include **ARE 500 (Applied Microeconomics)** and **ARE 530 (Production Economics)** or equivalent. In addition, all students must take a minimum of twelve (12) hours of quantitative courses including **ARE 521 (Quantitative Methods)**, **ARE 524 (Econometric Methods)**, **ARE 543 (Project Analysis and Evaluation)**, and **ECON 721 (Mathematical Economics)**. **ECON 425** and **ECON 421** are included in the graduate program as pre-requisites for quantitative requirement. **All course work should be selected in consultation with the student's major professor and graduate committee. Students must have their Plan of Study finalized prior to pre-registration for the second term of study.**

Thus, all students in M.S program are required to take the following set of core courses:

ARE 500 Applied Microeconomics

ARE 521 Quantitative Methods

ARE 524 Econometric Methods

ARE 530 Production Economics

ARE 543 Project Analysis and Evaluation

ECON 721 Mathematical Economics

AGEE 692B Research Methods

Additional Courses. Additional elective courses, to make up the minimum course work requirement, should be selected in consultation with the student's advisor and graduate committee. University guidelines stipulate that all graduate students are expected to participate in a seminar course throughout their graduate career. The *ARE* program seminar course is ARE 696.

7. Structure of a Typical M.S. Program

M.S. PROGRAM BY YEAR (Assuming ECON 301, 421 and 425 or equivalent pre-requisites completed)	
<u>YEAR ONE (FALL TERM)</u>	<u>YEAR ONE (SPRING TERM)</u>
ARE 500 <i>Applied Microeconomics</i> ECON 721 <i>Mathematical Economics</i> AGEE 692B <i>Research Methods</i> ARE 696 <i>Graduate Seminar</i> (1 hour)	ARE 530 <i>Production Economics</i> ARE 524 <i>Econometric Methods</i> ARE 543 <i>Project Analysis & Evaluation</i> ARE 696 <i>Graduate Seminar</i> (1hr.)
<u>SUMMER TERM I</u>	<u>SUMMER TERM II</u>
ARE 697 <i>Research</i> (thesis option) or Course Work (non-thesis option)	ARE 697 <i>Research</i> (thesis option) or Course Work (non-thesis option)
<u>YEAR TWO (FALL TERM)</u>	<u>YEAR TWO (SPRING TERM)</u>
ARE 521 <i>Quantitative Methods</i> ARE 696 <i>Graduate Seminar</i> (1 hour) ARE 697 <i>Research</i> (thesis option)	ARE 697 <i>Research</i> (thesis option) or additional course work (non-thesis option) ARE 696 <i>Graduate Seminar</i> (1 hr.)

B. THE DOCTOR OF PHILOSOPHY PROGRAM

The ARE program in the Division of Resource Management offers a doctoral degree (Ph.D.) in Resource Management and Sustainable Development with options in Natural Resource Economics (NRE) and Resource Management (RM). Students entering the NRE major may focus on Natural Resource and Environmental Economics, and Economic Development. NRE provides students with a strong foundation in economic theory, economic and policy analysis, and quantitative methods. The RM major is an interdisciplinary track with an applied economics foundation developed jointly by the student and the graduate advisory committee. Beyond the core requirements, RM provides flexibility for the student to pursue various combinations of courses (such as Forest Management, Recreation and Parks, Wildlife Management, Sociology, Geography, Economics, Political Science, and Regional Science) depending upon the student's interests and objectives after graduation.

The primary objective of the Ph.D. program in Resource Management and Sustainable Development is to educate persons so that they are capable of meeting the demands of the highest levels of their professions.

1. General Requirements

The Ph.D. student must meet all University, College, and Program requirements as outlined in the WVU *Graduate Catalog*. These include enrollment, residency, and grade

point requirements. Students are expected to enroll continuously and must register for at least one course every seven terms to remain as an active student. The residency requirement consists of one year of full-time graduate study at WVU. A minimum Grade Point Average of 3.0 must be attained on all course work taken during the period of graduate study.

2. Plan of Study

Each Ph.D. student should complete a written plan of study during his/her first full year of graduate study. This plan should be developed by the student in conjunction with his/her graduate committee and must be approved by the Director of the Division of Resource Management and the Associate Dean for Academic Affairs of the Davis College Agriculture, Forestry and Consumer Sciences. The blue Plan of Study form should be used for this purpose, a hard copy and/or disk copy of which can be obtained from the *ARE* Graduate Program Coordinator, among others.

3. Curriculum and Courses

The Ph.D. program is composed of two sets of courses: core courses taken by all students, and field courses, which are selected based on the student's research focus. However, it should be noted that the Ph.D. degree is a research degree. Those courses should be taken which impart the knowledge required to conduct successful research in Resource Management and Sustainable Development. Written examinations will be used to determine if the student has the requisite knowledge and skill to be admitted to candidacy for the Ph.D.

4. Core Courses

All doctoral students must satisfactorily complete a set of common core courses in research methods, a teaching practicum, and graduate seminars for a total of at least 9 credit hours. Course requirements may be waived if the student has received equivalent training in prior coursework. Coursework pertaining to the student's major and emphasis will be determined by the student's major professor and graduate committee.

In addition to the requirements indicated above, all students in the NRE option are also required to take the following set of core courses:

ARE 530 Production Economics

ARE 632 Natural Resource & Environmental Economics

ARE 633 Natural Resource Policy Analysis

ECON 701 Microeconomics I

ECON 721 Mathematical Economics

ECON 725 Econometrics I

In addition to the requirements indicated above, all students in the RM option are also required to take the following set of core courses:

ARE 500 Applied Microeconomics
ARE 521 Quantitative Methods in Resource Economics
ARE 530 Production Economics
ARE 632 Natural Resource & Environmental Economics
ARE 633 Natural Resource Policy Analysis
ARE 524 Econometric Methods in Resource Economics
ARE 543 Project Analysis & Evaluation
ECON 721 Mathematical Economics

5. Field Courses

Beyond the core courses, fields are required for both options. Each of the two mandatory fields of specialization requires at least nine hours for NRE option. A course in macroeconomics and/or history of economic thought, though not required, is strongly recommended. Each of the two mandatory fields of specialization in the RM option requires a minimum of 12 hours.

For both NRE and RM options, two field examinations in the fields of specialization are required. **The first field must be selected from one of the two fields specified below** or it can be a separate field designated in conjunction with the students' graduate committee. Students entering the NRE or RM options with a master's degree may petition their graduate committee to accept this M.S. degree as meeting one field exam requirement. Approval depends on the relevance of the degree to the options, the GPA in the most closely related courses, and the time elapsed since earning the degree.

The courses for the currently available fields within the NRE option include:

Natural Resource and Environmental Economics

ARE 703 Advanced Natural Resource Economic Theory
ARE 710 Advanced Environmental Economics
ECON 741 Public Economics I
ECON 742 Public Economics II
POLS 531 Economic Analysis of Public Policies

Economic Development

ARE 540 Rural and Regional Development
ARE 542 International Agricultural Economic Development
ARE 543 Project Analysis & Evaluation
ARE 644 International Markets and Trade
ARE 546 Energy and Regional Development

ECON 751 Advanced International Economics
 ECON 761 Advanced Regional Economics

In addition to the core and field courses listed above, University guidelines stipulate that all graduate students **are expected to participate in a seminar course throughout their graduate career.** The *ARE* program seminar course is ARE 696. The seminar may be repeated for credits, and must be taken on a satisfactory/unsatisfactory basis. Students are also encouraged to attend the weekly RRI seminar and seminars sponsored by the Economics Department.

6. Typical Ph.D. Program in Natural Resource Economics (NRE)

A typical doctoral program takes approximately three to four years depending on, among other things, whether or not the student has a related, prior, M.S. degree. The first year is dedicated to the study of economic theory and quantitative methods in preparation for the qualifying exam; although some field courses may also be taken. During the second year, students normally complete their fields and begin work on their dissertations. The dissertation takes one to two additional years of work. A typical plan of study for the Ph.D. program is outlined below.

Ph.D. PROGRAM BY YEAR	
<u>YEAR ONE (FALL TERM)</u>	<u>YEAR ONE (SPRING TERM)</u>
ARE 633 <i>Nat Res Policy Analysis</i> ECON 701 <i>Microeconomic Theory 1</i> ECON 721 <i>Mathematical Economics</i> ARE 696 <i>Graduate Seminar</i> (1 hr.)	ARE 530 <i>Production Economics</i> ARE 632 <i>Nat Res & Env Econ</i> ECON 725 <i>Econometrics 1</i> ARE 696 <i>Graduate Seminar</i> (1 hr.) Field course or elective
<u>YEAR TWO (FALL TERM)</u>	<u>YEAR TWO (SPRING TERM)</u>
Field Courses Electives* ARE 696 <i>Graduate Seminar</i> (1 hr.)	Field Courses Electives
BEYOND YEAR TWO: Dissertation Research, ARE 697	
SUMMER TERMS: Research/Field Courses/Electives (3 hours each session or 6 hours total to be classified as a full-time student during a Summer term).	

* Strongly recommended to include a course in macroeconomic theory or history of economic thought.

Recommended Electives include:

ECON 711 Microeconomic Theory 2
 ECON 726 Econometrics 2

ECON 722 Advanced Mathematical Economics
 ECON 727 Econometrics 3.
 STAT 461 Probability Theory

Year 1: The first year of the Ph.D. program in Natural Resource Economics is designed to give the student a sound foundation in economic theory and quantitative methods to prepare the student for advanced study in the second year of the program. At the end of the first year, the student is expected to demonstrate mastery of microeconomic theory and quantitative methods by passing the comprehensive qualifying examinations. All students must take one graduate course in *macroeconomic* theory which may be taken in the first or second year.

Year 2: The second year of the Ph.D. program is designed to be flexible, permitting the student to complete advanced theory and quantitative courses as well as pursue his/her specialized fields of study. Written *field* exams will normally be completed before the end of the second year of study.

Beyond Year 2: usually devoted to dissertation research, which normally will have already been initiated during a prior summer term.

7. Typical Ph.D. Program in Resource Management (RM)

Ph.D. PROGRAM BY YEAR	
<u>YEAR ONE (FALL TERM)</u>	<u>YEAR ONE (SPRING TERM)</u>
ARE 500 Applied Microeconomics ECON 721 <i>Mathematical Economics</i> AGEE 692B <i>Research Methods</i> ARE 696 <i>Graduate Seminar</i> (1 hr.)	ARE 530 <i>Production Economics</i> ARE 632 <i>Nat Res & Env Econ</i> ARE 524 <i>Econometric Methods</i> ARE 696 <i>Graduate Seminar</i> (1 hr.)
<u>YEAR TWO (FALL TERM)</u>	<u>YEAR TWO (SPRING TERM)</u>
ARE 633 <i>Nat Res Plcy Anly</i> ARE 521 <i>Quantitative Methods</i> ARE 696 <i>Graduate Seminar</i> (1 hr.) Field Courses Electives	ARE 543 <i>Proj. Anlysis & Evaluation</i> ARE 690 Teaching Practicum ARE 696 <i>Graduate Seminar</i> (1 hr.) Field Courses Electives
BEYOND YEAR TWO: Dissertation Research, ARE 697	
SUMMER TERMS: Research/Field Courses/Electives (3 hours each session or 6 hours total to be classified as a full-time student during a Summer term).	

8. Examinations

Students take 12 hours of written and 2 hours of oral qualifying examinations after the completion of the core and major field courses. Upon satisfactory completion of the qualifying examinations and field of specialization requirements, the student will be eligible for admittance to candidacy for the Ph.D. in Resource Management and Sustainable Development. Examinations for the Ph.D. consist of (a) a written preliminary examination on the core course materials (also known as the comprehensive or qualifying exam), (b) written examinations on each field selected by the student, and (c) a final oral examination on the dissertation. The preliminary examination will be given by the *ARE* program Ph.D. Examination Committee. Students in NRE will normally take it by the end of the first full year of study at or near the end of the Spring term each academic year. Students in RM will normally take it by the middle of the second full year of study at or near the end of the Fall term each academic year. The following core courses will be the basis for the preliminary examination: **ARE 632, ARE 633, ECON 701, ECON 721, and ECON 725 for NRE and ARE 500, ARE 521, ARE 524, ARE 530, ARE 632, ARE 633, and ECON 721 for RM.**

Field examinations will be scheduled as required in each field but, normally, will be offered only one time each academic year. The field exams are conducted by the student's graduate committee.

Students who fail on a written examination will be allowed to retake the examination one time. This, normally, would be scheduled as required or could be at the next regularly scheduled examination. The final oral examination, administered by the student's graduate committee, is scheduled following the successful completion of the preliminary and field exams, the residency requirement described in the *Graduate Catalog*, and upon completion of the dissertation itself. A second failure of any of the Ph.D. Program Examinations is grounds for removal from the program.

9. Dissertation

During the second year the student develops a dissertation topic in consultation with a selected faculty committee. Part of this process includes the development of a comprehensive research proposal or prospectus that forms the basis for the dissertation, and which is formally presented and defended by the student to his or her graduate committee in an open seminar. It normally takes up to two additional years to conduct the research and write the dissertation. During the period of dissertation research the student may take a limited amount of course work. The dissertation must (a) be based on a previously approved research proposal or prospectus, which the student formally presents to his or her graduate committee, (b) conform to written University dissertation guidelines (available on request from, among others, the *ARE* Graduate Program Coordinator), and (c) follow a consistent style (e.g., that reflected in the major disciplinary professional journals or a widely used manual such as the *University of Chicago Manual of Style: A Manual for Authors* published by the American Mathematical Society).

University regulations pertaining to Ph.D. candidacy and the dissertation, as well as a summary of doctoral requirements, are outlined in the *Graduate Catalog*.

Agricultural and Resource Economics (ARE) Graduate-Level Courses

500. Applied Microeconomics. I. 3 hr. PR: Econ 301 and 421, or equiv. Producer and consumer economics used in resource, environmental, and agricultural economic analysis.

521. Quantitative Methods in Resource Economics. I. 3 hr. PR: ECON 421 or equivalent. Optimization techniques in economic analysis of natural resources; environmental and agricultural management problems; linear, nonlinear and dynamic programming.

524. Econometric Methods in Resource Economics. I. 3 hr. PR: ECON 425. Application methods to natural resource, environmental, and agricultural economic problems; single and simultaneous equation models, specification problems, topics in time series, and cross-sectional analysis.

530. Production Economics. II. 3 hr. PR: ARE 500 and 521. Developments in producer economics applied to natural resources, environmental and agricultural issues.

540. Rural and Regional Development. II. 3 hr. PR: ARE 500 and 521. Economic theories and quantitative techniques. Problems and goals for rural and regional planning; methods of policy analysis for community infrastructure development.

542. International Agricultural Economic Development. I. 3 hr. Current problems, theories, policies, and strategies in planning for agricultural and rural development for increased food production and to improve the well-being of rural people in the developing countries of the world.

543. Project Analysis & Evaluation II. 3 hr. PR: Consent. Design, analysis and evaluation of development projects; economic and financial aspect of project analysis; risk analysis; preparation of feasibility reports.

546. Energy and Regional Development. II. 3 hr. PR: ECON 355 and ARE 580. Energy in the West Virginia economy and selected regions of the United States.

580. Energy Industry Economics. II. 3 hr. PR: Graduate Standing. Technical production and consumption methodologies, environmental concerns, and national and global economies and politics in making energy decisions.

581. Resource Appraisal and Decision Making. II. 3 hr. PR: ARE 500 or equivalent. Investment analysis, decision making under risk and uncertainty, and project analysis applied to resource exploration and utilization; mineral and energy reserve and resource estimation techniques.

582. Mineral Industry Economics. II. 3 hr. Supply, demand, structure, technology, costs, prices, and problems of mineral industries.

583. Minerals Technology Assessment. II. 3 hr. PR: Consent. Methods of studying the effects of modifications in technology on the production of utilization of minerals, and the effects on mineral demand, supply, substitution and markets.

584. Oil and Gas Industry Economics. II. 3 hr. PR: Consent. Geology, engineering, and economic theories of evaluating industry structures and performance.

585. Economics of the Coal Industry. I. 3 hr. PR: Consent. Supply, demand, structure, production technology, costs, prices, and problems of the coal industry. Includes environmental, productivity, and transportation issues.

600. Research Methods. II. 1 hr. Research Methods in agricultural, environmental and resource economics. The application of scientific thinking in the development of research proposals and critique of published research.

603. Advanced Natural Resource Economic Theory. I. 3 hr. PR: ECON 701 and ARE 632. Allocation and distribution of natural resources in static and dynamic contexts; welfare economics, cost-benefit analysis, and optimal control approaches; applications to resource valuation, exhaustion, taxation, and regulation in theory and practice.

629. Resource Commodity Markets. II. 3 hr. PR: ECON 725 and 726 or consent. Advanced econometric methods of specification, estimation and simulation of domestic and international resource markets and industries; time series and forecasting techniques.

632. Natural Resource and Environmental Economics. II. 3 hr. PR: ARE 500 and 521 or equivalent. Theory and institutions; market failure, externalities and property rights issues; renewable and nonrenewable resources, common property, environmental and resource management, and intergenerational decisions.

633. Natural Resource Policy Analysis. I. 3 hr. PR: ARE 530 and 521, or equiv. Welfare economics applied to the analysis and evaluation of natural resource, environmental, agricultural, and energy policy issues.

644. International Markets and Trade. I. 3 hr. PR: ARE 500 and 521. Causes and consequences of international trade and investment; commodity market structures, commodity price instability and international agreements; trade barriers and protection, export promotion, and impacts on developing countries.

665. Mineral Finance. II. 3 hr. Methods, risks, and problems of financing mineral projects. Large foreign-project financing, concerns of host governments, multinational mining concerns, and financial institutions.

695. Independent Study. I, II. 1-4 hr. PR: Consent. Faculty-supervised study of topics not available through regular course offerings.

696. Graduate Seminar. I, II, S. 1 hr. PR: Consent

697. Thesis/Dissertation Research. I, II, S. 1-15 hr. PR: Consent

710. Advanced Environmental Economics. II. 3 hr. PR: ECON 701 and ARE 632 or consent. Theory, efficient environmental design and analysis, modeling of economic and environmental system, evaluation of non-market benefits and costs, and risk assessment.

Resource Management (RESM)

691. Advanced Study. I, II, S. 1-6 hrs. PR: Consent

697. Research. I, II, S. 1-15 hr. PR: Consent

Economics (ECON)

701. Microeconomic Theory 1

711. Microeconomic Theory 2

722. Advanced Mathematical Economics

721. Mathematical Economics

725. Econometrics 1

726. Econometrics 2

727. Econometrics 3.