

# Agricultural and Resource Economics

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The Department of Agricultural and Resource Economics offers programs leading to PhD degrees. Because of quota limitations, students are rarely admitted for the master's degree, although it may be awarded to students who are pursuing work toward the PhD in our program (or in another field at Berkeley) after fulfillment of the appropriate MS requirements.

The Agricultural and Resource Economics Program is relatively flexible; however, the program stresses economic theory, quantitative methods, and two elective fields defined in consultation with the graduate adviser. Some common elective fields include agriculture in economic development, agricultural policy, natural resource economics, and international markets and trade.

## Admission to the University

### Minimum Requirements for Admission

The following minimum requirements apply to all graduate programs and will be verified by the Graduate Division:

1. A bachelor's degree or recognized equivalent from an accredited institution;
2. A grade point average of B or better (3.0);
3. If the applicant comes from a country or political entity (e.g., Quebec) where English is not the official language, adequate proficiency in English to do graduate work, as evidenced by a TOEFL score of at least 90 on the iBT test, 570 on the paper-and-pencil test, 230 on the computer-based test, or an IELTS Band score of at least 7 (note that individual programs may set higher levels for any of these); and
4. Sufficient undergraduate training to do graduate work in the given field.

### Applicants Who Already Hold a Graduate Degree

The Graduate Council views academic degrees not as vocational training certificates but as evidence of broad training in research methods, independent study, and articulation of learning. Therefore, applicants who already have academic graduate degrees should be able to pursue new subject matter at an advanced level without need to enroll in a related or similar graduate program.

Programs may consider students for an additional academic master's or professional master's degree only if the additional degree is in a distinctly different field.

Applicants admitted to a doctoral program that requires a master's degree to be earned at Berkeley as a prerequisite (even though the applicant already has a master's degree from another institution in the same or a closely allied field of study) will be permitted to undertake the second master's degree, despite the overlap in field.

The Graduate Division will admit students for a second doctoral degree only if they meet the following guidelines:

1. Applicants with doctoral degrees may be admitted for an additional doctoral degree only if that degree program is in a general area of

knowledge distinctly different from the field in which they earned their original degree. For example, a physics PhD could be admitted to a doctoral degree program in music or history; however, a student with a doctoral degree in mathematics would not be permitted to add a PhD in statistics.

2. Applicants who hold the PhD degree may be admitted to a professional doctorate or professional master's degree program if there is no duplication of training involved.

Applicants may apply only to one single degree program or one concurrent degree program per admission cycle.

Any applicant who was previously registered at Berkeley as a graduate student, no matter how briefly, must apply for readmission, not admission, even if the new application is to a different program.

## Required Documents for Applications

1. **Transcripts:** Applicants may upload *unofficial* transcripts with your application for the departmental initial review. *If the applicant is admitted*, then *official* transcripts of all college-level work will be required. Admitted applicants must request a current transcript from every post-secondary school attended, including community colleges, summer sessions, and extension programs. Official transcripts must be in sealed envelopes as issued by the school(s) attended.  
If you have attended Berkeley, upload your unofficial transcript with your application for the departmental initial review. *If you are admitted*, an official transcript with evidence of degree conferral *will not* be required.
2. **Letters of recommendation:** Applicants may request online letters of recommendation through the online application system. Hard copies of recommendation letters must be sent directly to the program, not the Graduate Division.
3. **Evidence of English language proficiency:** All applicants from countries or political entities in which the official language is not English are required to submit official evidence of English language proficiency. This applies to applicants from Bangladesh, Burma, Nepal, India, Pakistan, Latin America, the Middle East, the People's Republic of China, Taiwan, Japan, Korea, Southeast Asia, most European countries, and Quebec (Canada). However, applicants who, at the time of application, have already completed at least one year of full-time academic course work with grades of B or better at a US university may submit an official transcript from the US university to fulfill this requirement. The following courses will not fulfill this requirement: 1) courses in English as a Second Language, 2) courses conducted in a language other than English, 3) courses that will be completed after the application is submitted, and 4) courses of a non-academic nature. If applicants have previously been denied admission to Berkeley on the basis of their English language proficiency, they must submit new test scores that meet the current minimum from one of the standardized tests.

## Where to Apply

Visit the Berkeley Graduate Division application page (<http://grad.berkeley.edu/admissions/apply>).

## Curriculum

A,RESE 201 Production, Industrial Organization, and Regulation in Agriculture

A,RESEC 202	Issues and Concepts in Agricultural Economics	4
A,RESEC 211	Mathematical Methods for Agricultural and Resource Economists	4
A,RESEC 212	Econometrics: Multiple Equation Estimation	4
A,RESEC 213	Applied Econometrics	4
A,RESEC 219A	Econometric Project Workshop	2
A,RESEC 219B	Econometric Project Workshop	2
ECON 201A	Economic Theory	4
ECON 201B	Economic Theory	4
ECON 202A or ECON 202B	Macroeconomic Theory	4
ECON 204 or MATH 104	Mathematical Tools for Economics Introduction to Analysis	3

## Agricultural and Resource Economics

A,RESEC 201 Production, Industrial Organization, and Regulation in Agriculture 4 Units

Terms offered: Fall 2015, Fall 2014, Fall 2013

Basic concepts of micro and welfare economics: partial and general equilibrium. Industrial organization: monopolistic competition, vertical integration, price discrimination, and economics of information with applications to food retailing, cooperatives, fishing, and energy.

### Rules & Requirements

**Prerequisites:** Economics 201A or equivalent or consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of discussion per week

### Additional Details

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 202 Issues and Concepts in Agricultural Economics 4 Units

Terms offered: Spring 2017, Spring 2016, Spring 2015

History, institutions, and policies affecting agriculture markets and environmental quality. Producer behavior over time and under uncertainty. Asset fixity and agricultural supply models.

### Rules & Requirements

**Prerequisites:** Economics 201A-201B or consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of discussion per week

### Additional Details

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 210 Probability and Statistics 3 Units

Terms offered: Fall 2017, Fall 2016, Fall 2015

This is an introduction to probability theory and statistical inference. It is primarily intended to prepare students for the graduate econometrics courses 212 and 213. The emphasis of the course is on the principles of statistical reasoning. Probability theory will be discussed mainly as a background for statistical theory and specific models will, for the most part, be considered only to illustrate the general statistical theory as it is developed.

### Rules & Requirements

**Prerequisites:** Graduate standing or consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 4 hours of lecture per week

### Additional Details

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 211 Mathematical Methods for Agricultural and Resource Economists 4 Units

Terms offered: Fall 2015, Fall 2014, Fall 2013

The goal of this course is to provide entering graduate students with the basic skills required to perform effectively in the graduate program and as professional economists. The lectures place heavy emphasis on intuition, graphical representations, and conceptual understanding. Weekly problem sets provide the opportunity to master mechanical skills and computational techniques. Topics covered include real analysis, linear algebra, multivariable calculus, theory of static constrained optimization, and comparative statics.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 4 hours of lecture and 1 hour of discussion per week

### Additional Details

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 212 Econometrics: Multiple Equation Estimation 4 Units  
 Terms offered: Spring 2017, Spring 2016, Spring 2015  
 Introduction to the estimation and testing of economic models. Includes analysis of the general linear model, asymptotic theory, instrumental variable, and the generalized method of moments. In addition, a survey of time series, analysis, limited dependent variables.

**Rules & Requirements**

**Prerequisites:** 211 or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 4 hours of lecture and 1 hour of discussion per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 213 Applied Econometrics 4 Units  
 Terms offered: Fall 2017, Fall 2016, Fall 2015  
 Standard and advanced econometric techniques are applied to topics in agriculture and resource economics. Techniques include limited dependent variables, time series analysis, and nonparametric analysis. Students will use computers to conduct statistical analyses.

**Rules & Requirements**

**Prerequisites:** 211 and 212 or equivalent or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 214 New Econometric and Statistical Techniques 4 Units  
 Terms offered: Spring 2012, Spring 2011, Spring 2010  
 Theory and application of new and emerging approaches to estimation and inference. Bayesian, maximum entropy, and other new applications to economic problems will be emphasized. Students will use computers to conduct statistical analyses.

**Rules & Requirements**

**Prerequisites:** 211, 213 or equivalent or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 219A Econometric Project Workshop 2 Units  
 Terms offered: Fall 2017, Fall 2016, Fall 2015  
 Techniques for preparing econometric studies, including finding data sources, the reporting of results, and standards for placing research questions with existent literature. With faculty guidance, students prepare approved econometric projects, present projects to the class, provide comments on other student projects, and revise projects in response to faculty and student comments.

**Rules & Requirements**

**Prerequisites:** 210, 211, and 212 or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 2 hours of seminar per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

**Instructors:** Auffhammer, Sadoulet

A,RESEC 219B Econometric Project Workshop 2 Units  
 Terms offered: Spring 2017, Spring 2016, Spring 2015  
 Techniques for preparing econometric studies, including finding data sources, the reporting of results, and standards for placing research questions with existent literature. With faculty guidance, students prepare approved econometric projects, present projects to the class, provide comments on other student projects, and revise projects in response to faculty and student comments.

**Rules & Requirements**

**Prerequisites:** 210, 211, and 212 or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 2 hours of seminar per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

**Instructors:** Auffhammer, Sadoulet

A,RESEC 232 Empirical International Trade and Investment 2 Units  
Terms offered: Spring 2010, Spring 2009, Spring 2007

Empirical aspects on international trade, foreign investment, and the environment. Issues related to testing various trade models. Topics include: testing trade models (HO, Ricardo, Specific Sector); gravity models; linkages between openness and growth; trade orientation and firm performance; pattern of trade; trade and the environment; labor markets and trade. New topics in international trade with empirical applications, such as trade models with heterogeneous firms, outsourcing and foreign investment.

**Rules & Requirements**

**Prerequisites:** Consent of instructor

**Hours & Format**

**Fall and/or spring:** 8 weeks - 2 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 241 Economics and Policy of Production, Technology and Risk in Agricultural and Natural Resources 3 Units

Terms offered: Fall 2017, Fall 2016, Fall 2015

This course covers alternative models of production, resource and environmental risk management; family production function; adoption and diffusion; innovation and intellectual property rights; agricultural and environmental policies and their impact on production and the environment; water resources; pest control; biotechnology; and optimal control over space and time.

**Rules & Requirements**

**Prerequisites:** 201 and 202, or Economics 201A-201B, or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 242 Quantitative Policy Analysis 3 Units

Terms offered: Spring 2017, Spring 2016, Spring 2015

Production versus predatory government behavior, rent seeking, social waste, and their trade-offs with the provision of growth-promoting public goods. Three failure types are distinguished: market, government, and organizational. The roles of public versus special interests are modeled to determine degree and extent of organizational failures in collective group behavior. Alternative frameworks are used to evaluate various types of policy reform.

**Rules & Requirements**

**Prerequisites:** 211 or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 249 Agricultural, Food, and Resource Policy Workshop 1 Unit

Terms offered: Fall 2017, Spring 2017, Fall 2016

Presentation and criticism of ongoing research by faculty, staff and students. Not necessarily offered every semester.

**Rules & Requirements**

**Prerequisites:** Consent of instructor

**Repeat rules:** Course may be repeated for credit. Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 2 hours of seminar per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

A,RESEC C251 Microeconomics of Development 3 Units

Terms offered: Fall 2017, Fall 2016, Fall 2015

Theoretical and empirical analyses of poverty and inequality, household and community behavior, and contract and institutions in the context of developing countries.

**Rules & Requirements**

**Prerequisites:** Consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

**Also listed as:** ECON C270A

A,RESEC C253 International Economic Development Policy 3 Units  
Terms offered: Fall 2017, Fall 2016, Fall 2015

This course emphasizes the development and application of policy solutions to developing-world problems related to poverty, macroeconomic policy, and environmental sustainability. Methods of statistical, economic, and policy analysis are applied to a series of case studies. The course is designed to develop practical professional skills for application in the international arena.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

**Also listed as:** PUB POL C253

A,RESEC 259 Rural Economic Development Workshop 1 Unit  
Terms offered: Fall 2017, Spring 2017, Fall 2016  
Presentation and criticism of ongoing research by faculty, staff and students. Not necessarily offered every semester.

**Rules & Requirements**

**Prerequisites:** Consent of instructor

**Repeat rules:** Course may be repeated for credit. Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 2 hours of seminar per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

A,RESEC 261 Environmental and Resource Economics 3 Units  
Terms offered: Fall 2017, Fall 2016, Spring 2016  
Theory of renewable and nonrenewable natural resource use, with applications to forests, fisheries, energy, and climate change. Resources, growth, and sustainability. Economic theory of environmental policy. Externality; the Coasian critique; tax incidence and anomalies; indirect taxes; the double dividend; environmental standards; environmental regulation; impact of uncertainty on taxes and standards; mechanism design; monitoring, penalties, and regulatory strategy; emissions markets.

**Rules & Requirements**

**Prerequisites:** Ph.D.-level economic theory or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 262 Non-market Valuation 3 Units  
Terms offered: Spring 2014, Spring 2012, Spring 2011

The economic concept of value; historical evolution of market and non-market valuation; revealed preference methods: single site demand, multi-site demand, corner solution models, and valuation of quality changes; averting behavior; the hedonic method; contingent valuation; other stated preference methods: ranking, choice, conjoint analysis; the value of life and safety; sampling and questionnaire design for valuation surveys.

**Rules & Requirements**

**Prerequisites:** Ph.D.-level economic theory or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 263 Dynamic Methods in Environmental and Resource Economics 3 Units  
Terms offered: Spring 2017, Spring 2016, Fall 2013  
This course studies methods of analysis and optimal control of dynamic systems, emphasizing applications in environmental and natural resource economics. Continuous-time deterministic models are studied using phase plane analysis, the calculus of variations, the Maximum Principle, and dynamic programming. Numerical methods are applied to discrete time stochastic and deterministic dynamic models.

**Rules & Requirements**

**Prerequisites:** Ph.D.-level economic theory or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 264 Empirical Energy and Environmental Economics 3 Units  
Terms offered: Spring 2017, Spring 2016, Spring 2015

This course is designed to help prepare graduate students to conduct empirical research in energy and environmental economics. The course has two broad objectives. The first is to develop an in-depth understanding of specific empirical methods and research designs that are routinely used in the field of energy and environmental economics. The second is to familiarize students with some of the economic theories and institutions that are most relevant to empirical work in this area.

**Rules & Requirements**

**Prerequisites:** 212 and 213; or equivalent

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

**Instructor:** Fowlie

A,RESEC 265 Advanced Topics in Environmental and Resource Economics 3 Units  
Terms offered: Fall 2015

Advanced topics in environmental and resource economics. Topics vary and include the economics of land, water, fisheries, forestry, pesticides, endangered species, policy instruments for environmental policy, and empirical evaluations of environmental and resource policy.

**Rules & Requirements**

**Prerequisites:** Ph.D.-level economic theory and econometrics or consent of instructor

**Repeat rules:** Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 2 hours of lecture and 1 hour of discussion per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

**Instructors:** Berck, Sunding

A,RESEC 269 Natural Resource Economics Workshop 1 Unit  
Terms offered: Fall 2017, Spring 2017, Fall 2016

Presentation and criticism of ongoing research by faculty, staff, and students. Not necessarily offered every semester.

**Rules & Requirements**

**Prerequisites:** Consent of instructor

**Repeat rules:** Course may be repeated for credit. Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 2 hours of seminar per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

A,RESEC 298 Special Study for Graduate Students 1 - 6 Units  
Terms offered: Fall 2017, Summer 2017 Second 6 Week Session, Spring 2017

All properly qualified graduate students who wish to pursue a special field of study may do so if their proposed program of study is acceptable to the member here of the staff with whom they work.

**Rules & Requirements**

**Prerequisites:** Consent of instructor

**Repeat rules:** Course may be repeated for credit. Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 1-6 hours of independent study per week

**Summer:**

6 weeks - 1-6 hours of independent study per week

8 weeks - 1-6 hours of independent study per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Letter grade.

A,RESEC 299 Individual Research 1 - 12 Units  
Terms offered: Fall 2017, Spring 2017, Fall 2016

**Rules & Requirements**

**Prerequisites:** Graduate standing and consent of instructor

**Repeat rules:** Course may be repeated for credit. Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 1-12 hours of independent study per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

A,RESEC 375 Professional Preparation: Teaching of Environmental Economics and Policy 1 - 6 Units

Terms offered: Fall 2017, Fall 2016, Fall 2015

Discussion, problem review and development, guidance of discussion classes, course development, supervised practice teaching.

**Rules & Requirements**

**Prerequisites:** Graduate standing, appointment as a graduate student instructor, or consent of instructor

**Repeat rules:** Course may be repeated for credit. Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 1-2 hours of lecture and 1-2 hours of discussion per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/ Professional course for teachers or prospective teachers

**Grading:** Offered for satisfactory/unsatisfactory grade only.

**Formerly known as:** Agriculture and Resource Economics 300

A,RESEC 400 Professional Training in Research Methodology 1 - 6 Units

Terms offered: Fall 2017, Spring 2017, Fall 2016

Individual training for graduate students in planning and performing research under the supervision of a faculty adviser, intended to provide academic credit for the experience obtained while holding a research assistantship.

**Rules & Requirements**

**Prerequisites:** Graduate student researcher appointment

**Repeat rules:** Course may be repeated for credit. Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 1-6 hours of independent study per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Other professional

**Grading:** Offered for satisfactory/unsatisfactory grade only.

A,RESEC 602 Individual Study for Doctoral Students 1 - 12 Units

Terms offered: Fall 2017, Spring 2017, Fall 2016

Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required for candidates of the Ph.D. May not be used for unit or residence requirements for the doctoral degree.

**Rules & Requirements**

**Repeat rules:** Course may be repeated for credit. Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 1-12 hours of independent study per week

**Additional Details**

**Subject/Course Level:** Agricultural and Resource Economics/Graduate examination preparation

**Grading:** Offered for satisfactory/unsatisfactory grade only.