AREC - AGRICULTURAL AND RESOURCE ECONOMICS

AREC405 Economics of Production (3 Credits)
The use and application of production economics in analysis of firm and policy decisions. Production functions, cost functions, multiple product and joint production, and production processes through time.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC422 Econometric Analysis in Agricultural and Environmental Economics (3 Credits)
This course offers a hands-on introduction to econometrics. Students will explore the linear regression model from the ground up by analyzing real-world datasets and learning how to distinguish causation from correlation. They will gain practical experience using econometrics to address important questions in agricultural economics and environmental economics.
Prerequisite: 1 course from (AREC326 or ECON326); and 1 course from (ECON230, ECON321, or BMGT230).
Credit Only Granted for: ECON422, ECON424, or AREC422.

AREC426 Economic Methods and Food Consumption Policy (3 Credits)
An overview of major econometric tools used by policy makers, economists and social scientists to analyze the effects of food consumption policy. Major food assistance programs in the United States such as SNAP, the School Lunch Program and the School Breakfast Program will be discussed.
Prerequisite: AREC326; or ECON326.
Credit Only Granted for: AREC489O or AREC426.
Formerly: AREC489O.

AREC427 Commodity Pricing and Markets (3 Credits)
Economic theory as applied to the marketing of agricultural commodities. How commodity prices vary with current demand and production, and how prices are linked over time, across space, and across grades.
The role played by contractual arrangements, cooperative marketing, vertical integration, and governmental policies in commodity marketing strategies.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC430 Introduction to Agricultural and Resource Law (3 Credits)
Survey of law with emphasis on problems and applications related to agricultural and natural resource economics. The course emphasizes strategies for managing legal risk arising from ownership, management, and use of agricultural resources. Students will get practical information to utilize in personal or professional settings. Contract law, constitutional law, tort law, property law, real estate transactions, business organization, estate planning, and debtor.
Prerequisite: ECON326 or AREC326.
Credit Only Granted for: AREC430 or AREC489K.
Formerly: AREC489K.

AREC431 Agricultural Water Quality: Policy and Legal Issues (3 Credits)
An overview of the American and Maryland legal systems and sources of legal information as it pertains to water quality and agriculture.
Prerequisite: AREC326; or ECON326; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: AREC489L or AREC431.
Formerly: AREC489L.

AREC433 Food and Agricultural Policy (3 Credits)
Economic and political context of governmental involvement in the farm and food sector. Historical programs and current policy issues. Analysis of economic effects of agricultural programs, their benefits and costs, and comparison of policy alternatives. Analyzes the interrelationship among international development, agricultural trade and general economic and domestic agricultural policies.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC435 Commodity Futures and Options (3 Credits)
The economics and institutional features of commodity futures and options markets. Students will develop a basic understanding of the underlying price relationships between cash and futures markets and will apply this information to business risk management decision making.
Prerequisite: AREC326; or ECON326; or students who have taken courses with comparable content may contact the department.

AREC445 Agricultural Development, Population Growth and the Environment (3 Credits)
Development theories, the role of agriculture in economic development, the agricultural policy environment, policies impacting on rural income and equity, environmental impacts of agricultural development.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC446 Sustainable Economic Development (3 Credits)
Examine why socially equitable and environmentally sustainable economic growth is difficult to achieve. It explores the interactive dynamics of environmental degradation, human capital, inequality and institutions. Emphasis is on the role of market imperfections and political failure in explaining the persistence of extractive economic institutions that hinder sustainable development.
Prerequisite: AREC326; or ECON326; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: AREC446 or AREC489G.
Formerly: AREC489G.

AREC447 The Economy of China (3 Credits)
An introductory survey course of economic development in China with emphasis on understanding the process of economic reform in mainland China since 1978.
Prerequisite: AREC326, ECON306, or ECON326.

AREC453 Natural Resources and Public Policy (3 Credits)
Rational use and reuse of natural resources. Theory, methodology, and policies concerned with the allocation of natural resources among alternative uses. Optimum state of conservation, market failure, safe minimum standard, and cost-benefit analysis.
Prerequisite: AREC326, ECON306, or ECON326; and (BMGT230 or ECON230).
Cross-listed with: ECON453.
Restriction: Must be in one of the following programs (Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness; Agricultural and Resource Economics: Environmental and Resource Economics; Economics Bachelor of Arts; Environmental Science & Policy-Env Economics; Social Data Science-Economics; Economics minor).
Credit Only Granted for: AREC453 or ECON453.

AREC454 The Economics of Climate Change (3 Credits)
The role of economics in the formation of climate policy; basic concepts of environmental economics including efficiency, externalities, and policy instruments; economic models of intertemporal decisions and decision making in the face of uncertainty. Applied economic analysis of specific issues and current policy initiatives.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230).
Cross-listed with: ECON484.
Credit Only Granted for: AREC454 or ECON484.

AREC455 Economics of Land Use (3 Credits)
Fundamentals of location theory. Microeconomics of land use decisions, including determination of rent and hedonic pricing models. Impacts of government decisions on land use, including regulation (e.g., zoning), incentives (transferable development rights), provision of public services, and infrastructure investments. Impacts of land use on environmental quality, including issues relating to sprawl, agricultural land preservation, and other topics of special interest.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230).
Cross-listed with: ECON485.
Credit Only Granted for: AREC455 or ECON485.

AREC456 Energy and Environmental Economics (3 Credits)
Economic theory and empirical methods are used to study problems of energy, the environment, and the economy. It examines the extraction, production, and use of energy and market institutions and regulatory approaches used to correct market failures. Topics covered include: oil and natural gas markets, management and design of electricity markets, renewable energy, non-market valuation , climate change, and transportation policies.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230).
Cross-listed with: ECON486.
Credit Only Granted for: AREC456 or ECON486.

AREC466 Transportation Engineering, Economics, and Policy (3 Credits)
The transportation system moves people and goods around the world, but transportation has downsides: harming local air quality, contributing to climate change, causing traffic accidents, and wasting people's time on congested roads. Mitigating these downsides will require new policies, new technologies, and new decisions by households and businesses. Focusing on the US transportation system, students will apply an integrated economics, policy, and engineering perspective to analyze transportation's most pressing challenges. Students are expected to have some background in one of the three disciplines--economics, engineering, or policy--but not all three. The beginning of the semester will include tutorials for students without much economics or engineering background.
Prerequisite: BMGT230, ECON230, ECON321, ENCE302, or PLCY304; or permission of the instructors.
Recommended: AREC326, ECON306 or ECON326.
Credit Only Granted for: AREC466 or ENCE489T.

AREC481 Environmental Economics (3 Credits)
An exploration of the use of economic incentives for protection of the environment and the determination of appropriate (or efficient) level of environmental quality. Also covers the choice of policy instruments for the attainment of environmental standards.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230).
Cross-listed with: ECON481.
Restriction: Must be in one of the following programs (Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness; Agricultural and Resource Economics: Environmental and Resource Economics; Economics Bachelor of Arts; Environmental Science & Policy-Env Economics; Social Data Science-Economics; Economics minor).
Credit Only Granted for: ECON481 or AREC481.

AREC489 Special Topics in Agricultural and Resources Economics (3 Credits)
Repeatable to: 9 credits.

AREC499 Honors Thesis Research (3-6 Credits)
Undergraduate honors thesis research conducted under the direction of an AGNR faculty member in partial fulfillment of the requirements of the College of AGNR Honors Program. The thesis will be defended to a faculty committee.
Restriction: Must be in the AGNR Honors program.
Repeatable to: 6 credits if content differs.

AREC610 Microeconomic Applications in Agricultural and Resource Markets (3 Credits)
Applications of graduate level microeconomic analysis to the problems of agricultural and natural resource production and distribution including demand for agricultural output, the nature of agricultural supply decisions, decision making under uncertainty, valuation of natural resources, and exploitation of natural resources.
Prerequisite: ECON603 and AREC620.

AREC620 Optimization in Agricultural and Resource Economics (3 Credits)
Mathematical theory of static and dynamic optimization as applied to the economics of agriculture, natural resources and the environment. Topics include necessary and sufficient conditions for constrained optimization, convexity and concavity, duality and the envelope theorem, comparative statics, fixed point theorems, optimal control theory and dynamic programming.
Prerequisite: Must have completed Multivariate calculus and matrix or linear algebra.

AREC623 Applied Econometrics I (4 Credits)
A modern introduction to empirical strategies in applied microeconomic research in public policy, development economics, labor economics, education, marketing and corporate finance. Emphasis on causal reasoning and design-driven identification in the social sciences. Concepts and applications will focus on addressing economically meaningful causal questions. Basic theoretical and mathematical aspects of probability and statistics will be developed to assess the significance of the relationship among economic variables. Topics include: the approximation of the conditional expectation function through a linear predictor (Ordinary Least Squares), the effects of omitted variables and the usefulness of variables that resemble the outcome of a randomized experiment (Instrumental Variables), as well as extensions to high-dimensional big-data counterparts. Fundamental concepts in sampling theory, statistical inference (with small and large samples) and hypothesis testing will be studied and applied to real data using Stata, a general-purpose statistical software.
Prerequisite: Introductory statistics or econometrics, linear algebra, and differential/calculus; or permission of instructor.
Additional Information: Intended for first-year Ph.D. students from AREC, BUFN, ECON, EDMS, EDUC, PLCY and URSP departments with a background in introductory statistics or econometrics.

AREC624 Applied Econometrics II (4 Credits)
Variations of the standard linear model, simultaneous equations estimation, nonlinear regression, nonlinear simultaneous equations estimation, static and dynamic panel data models, errors in variables, Hausman tests, discrete choice models such as conditional multinomial and mixed logit models, latent class models, semi-parametric estimation, varying parameter models, unobserved variables, time series models, and model selection procedures.
Prerequisite: AREC623.

AREC699 Special Problems in Agricultural and Resource Economics (1-2 Credits)
Intensive study and analysis of specific problems in the field of agricultural and resource economics, providing in-depth information in areas of special interest to the student.

AREC783 Environmental Taxation and Regulation (3 Credits)
The economics of policies to address environmental externalities. Specific topics include the theory of public goods and externalities, cost-benefit and cost-effectiveness analysis of environmental regulations, regulatory instrument choice under uncertainty, environmental policy in an economy with pre-existing tax distortions, monitoring and enforcement of environmental regulations, distributional effects of environmental policy, and regulation of intertemporal externalities.
Prerequisite: ECON603 and ECON604; and graduate-level econometrics.
Credit Only Granted for: AREC783 or AREC869W.
Formerly: AREC869W.

AREC784 Energy Economics, Empirical Industrial Organization, and Public Policy (3 Credits)
Energy markets and public policy, evaluating techniques for estimating market demand and supply and for evaluating policy intervention. Comparison of reduced-form and structural approaches. Applications may include but are not limited to electricity, oil and other liquid fuels, and household travel, with examples from the United States and other countries.
Prerequisite: ECON603, AREC623, and AREC624; or permission of instructor.

AREC785 Advanced Economics of Natural Resources (3 Credits)
The use of exhaustible and renewable natural resources from normative and positive points of view. Analysis of dynamic resource problems emphasizing energy, mineral, groundwater, forestry, and fishery resources; optimal, equilibrium, and intergenerational models of resource allocation.
Prerequisite: Permission of AGNR-Agricultural & Resource Economics department; or (ECON603 and AREC623).
Cross-listed with: ECON785.
Credit Only Granted for: AREC785 or ECON785.

AREC799 Master's Thesis Research (1-6 Credits)

AREC815 Experimental and Behavioral Economics (3 Credits)
An overview of the design, implementation, and analysis of experiments motivated by behavioral economics, with a particular focus on experiments in field settings. Topics covered include social preferences, risk aversion, prospect theory, present bias, overconfidence, and limited attention.
Prerequisite: AREC623, AREC624, ECON603, and ECON604; or equivalent.
Credit Only Granted for: AREC815 or AREC869A.
Formerly: AREC869A.

AREC829 Policy Design and Causal Inference for Social Science (3 Credits)
A course in applied econometrics that examines empirical strategies in applied microeconomic research used to estimate the effects of a policy or program on the outcomes of interest in fields like public policy, development economics, labor economics, education, marketing and corporate finance, as well as in industry and international organizations. Methods in applied econometrics with a focus on the thought experiment, the hypothetical experiment that should be used to answer the causal question of interest. A taxonomy of departures from the experimental ideal is presented, as well as the assumptions required to mimic the conditions of the unfeasible experiment from observational data. Topics include regression and matching, instrumental variables and natural experiments, differences-in-differences, change-in-changes, synthetic control methods and regression discontinuity designs. Causal parameters defined from conditional moments, and quantiles and effects on conditional distributions (for inequality and poverty assessment) are considered. Stata, a general-purpose statistical software widely used by applied economists, is used to develop concepts and applications.
Prerequisite: AREC623; or permission of instructor.
Repeatable to: 9 credits if content differs.
Additional Information: The course is intended for second-year Ph.D. students from AREC, BUFN, ECON, EDMS, EDUC, PLCY and URSP who have a background in quantitative methods comparable to that offered in an introductory micro-econometrics class.

AREC832 Agricultural Policy Analysis (3 Credits)
The economics of agricultural policies. The impact of agricultural policies on both historic and modern growth, including discussion of optimal farm and ownership structure. Contemporary policy issues in both developed and developing countries. Additional topics in trade, environment, and commodity markets.
Credit Only Granted for: AREC632 or AREC832.

AREC844 Firm Growth in Developing Countries (3 Credits)
A study of the growth of firms face in developing countries and interventions/policies that can be used to remove barriers to growth, including issues related to management, credit constraints, political connections, misallocation and trade.
Prerequisite: A one-year PhD-level sequence in microeconomics and a PhD-level course in econometrics.

AREC845 Environment and Development Economics (3 Credits)
Considers neoclassical and endogenous growth models; international trade theory; the role of property right institutions and factor markets; the environmental impact of trade liberalization in developing countries and the environmental effects of increasing international capital mobility; empirical studies relating the environment to growth and globalization; and policy analyses.

AREC847 Networks, Social Learning and Technology Adoption (3 Credits)
This class will focus on networks, learning from others, and peer effects and the role ofeach in human capital accumulation, technology adoption and behavior. The material isfocused on applications of education, health agriculture and entrepreneurship in developingcountries, but will draw heavily from literatures on these effects in developed countries aswell. The class will cover the theory of networks and learning but its primary focus will beon the empirical difficulty of identifying these effects and establishing causality.
Prerequisite: AREC624, AREC623, and ECON603; and students who have taken courses with comparable content may contact the department.

AREC869 Advanced Topics in Agricultural and Resource Economics (1-3 Credits)
Frontiers of research in environmental and resource economics; agricultural policy, production, and trade; and development. Topics may include decision making under risk and related market institutions, principal agent analysis, optimal policy design, technology adoption, market structure, land and credit markets, information markets, and income distribution.
Repeatable to: 9 credits if content differs.

AREC891 Introduction to Prospectus Development (1 Credit)
Critical evaluation of research, prospectus topic exploration including literature review, data identification, model development, and related presentations. Required of all second-year Ph.D. students.
Prerequisite: Completion of the first year of graduate study in AREC.
Credit Only Granted for: AREC 869K or AREC 891.
Formerly: AREC869K.

AREC892 Dissertation Prospectus Development (3 Credits)
Presentations of proposed dissertation research including literature review, model development, data identification, and written prospectus development. Required of all third-year Ph.D. students.
Prerequisite: Completion of two years of the AREC Ph.D. program.
Credit Only Granted for: AREC 869P or AREC 892.
Formerly: AREC869P.

AREC898 Pre-Candidacy Research (1-8 Credits)

AREC899 Doctoral Dissertation Research (1-8 Credits)