The department of economics has entered into a cooperative agreement with the department of economics of the University of Missouri-St. Louis to offer a master of arts in economics. A maximum of 12 graduate semester hours may be taken at Missouri S&T (with no more than 9 credit hours at the 4000-level).

**Management for Sustainable Business**

This certificate in management for sustainable business addresses an identified need to provide science and engineering students with business knowledge and professional skills to further their careers in business sustainability. The certificate will focus on building knowledge and competencies, specifically in the area of environmental sustainability of a business organization. The proposed program will provide professionals with the skills necessary for rapidly advancing themselves in the workplace, and more importantly, rapidly advancing the general knowledge base and skill set in their professional workplaces.

The curriculum consists of the following:

- **ECON 6641** Advanced Foundations of Sustainability
- **ECON 6642** Global Eco- and Social-preneurship and Innovation
- **ECON 6643** Advanced Ethical Problems in a Global Environment

Choose one of the following:

- **ECON 6440** Advanced Environmental and Natural Resource Economics
- **ECON 5532/ MIN ENG 5532** Advanced Mining Economics
- **ECON 6540** Advanced Energy Economics
- **ECON 6644** Creativity, Innovation, and Sustainability
- **ENG MGT 5320** Project Management
- **ENG MGT 5513** Energy and Sustainability Management Engineering
- **MIN ENG 5742** Environmental Aspects of Mining
- **MIN ENG 6735** Sustainability In Mining

**Bonnie J Bachman**, Professor  
PHD Rutgers University

**Michael C Davis**, Associate Professor  
PHD University of California-San Diego

**Mahelet Fikru**, Assistant Professor  
PHD Southern Illinois University-Carbondale

**Gregory Gelles**, Professor  
PHD West Virginia University

**Ana-Maria Ichim**, Assistant Professor  
PHD Louisiana State University

**Eun Soo Park**, Associate Professor  
PHD Northwestern University

**Radu Puslenghea**, Assistant Teaching Professor  
PHD University of Virginia

**Sarah Steelman**, Assistant Teaching Professor  
MA University of Missouri-Columbia

**Yishu Zhou**, Assistant Professor  
PHD University of Connecticut

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**ECON 5000 Special Problems** (IND 0.0-6.0)  
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

**ECON 5001 Special Topics** (LEC 0.0 and LAB 0.0)  
This course is designed to give the department an opportunity to test a new course.

**ECON 5010 Seminar** (RSD 0.0-6.0)  
Discussion of current topics.

**ECON 5120 Advanced Micro and Macro Economics Essentials** (LEC 1.5)  
An introduction to the essentials of micro and macro economics for running a business. It is designed for students planning to enter the MBA program who need this area and for non-business students who want some business background. Credit in this course cannot be applied to any major or minor in Business, IS&T, or Economics. Additional case or report required. Prerequisite: Bachelor Degree.

**ECON 5310 Advanced Mathematical Economics** (LEC 3.0)  
Marginal analysis, calculus, and linear algebraic systems are applied in selected advanced topics in economics such as price theory, general equilibrium theory, input-output analysis, activity analysis, and game theory. This course is an advanced version of Econ 4310, and will include additional research and project assignments. Credit cannot be obtained for both Econ 4310 and Econ 5310. Prerequisites: Econ 2100, 2200 and Math 1208, Math 3103.

**ECON 5330 Econometric Methods** (LEC 2.0 and LAB 1.0)  
A survey of econometric topics and methods illustrated through real world applications. Includes least squares estimation, generalized least squares, two-stage least squares, simultaneous equations models, panel data and qualitative choice models. Students will use modern statistical software packages (STATA, R) to perform hands-on quantitative analysis. Prerequisites: Econ 2100 and Econ 2200, Stat 3111 or Stat 3113 or Stat 3115 or Stat 3117 or Stat 5643.

**ECON 5337 Financial Mathematics** (LEC 3.0)  
The course objective is to provide an understanding of the fundamental concepts of financial mathematics. Topics include pricing, assets-liability management, capital budgeting, valuing cash flow, bonds, futures, swaps, options. Preparation for the financial mathematics actuarial exam will be provided. Prerequisites: Math 1215 or Math 1221, Econ 1100 or Econ 1200, and one of the following: Stat 3111, Stat 3113, Stat 3115, Stat 3117 or Stat 5643. (Co-listed with Math 5737).

**ECON 5342 Advanced Finance** (LEC 3.0)  
This course provides a rigorous and consistent presentation of the theory of financial decisions. Capital markets are analyzed under assumptions of risk aversion and uncertainty. Models of modern portfolio theory are discussed including the CAPM and the Modigliani-Miller analysis. This course is an advanced version of Econ 321, and will include additional research and project assignments. Credit cannot be obtained for both Econ 5160 and Econ 5342. Prerequisite: Econ 2100 or Econ 2200.
ECON 5430 Advanced Cost-Benefit Analysis (LEC 3.0)
Investigates the rationale for cost-benefit analysis within a free enterprise setting. Discussion of market efficiency and failure; determination of social costs and benefits; applications of cost-benefit analysis; and, problems remaining in theory and practice. This course is an advanced version of Econ 4430, and will include additional research and project assignments. Credit cannot be obtained for both Econ 4430 and Econ 5430. Prerequisite: Econ 2100.

ECON 5532 Advanced Mining Economics (LEC 3.0)

ECON 5644 Creativity, Innovation, and Sustainability (LEC 3.0)
This interdisciplinary course examines the use of innovation as a competitive technological strategy with a sustainability perspective. It explores ways in which individuals, groups, and organizations can become more creative and how leadership and a culture of change can be implemented.

ECON 5710 Advanced International Trade (LEC 3.0)
Analysis of gains from trade; the effects of factor mobility; effects of trade restrictions on trade flow and income distribution; arguments for restricting trade; and effects of trade on economic development, employment and human capital development. This course is an advanced version of Econ 4710+D1194, and will include additional research and project assignments. Credit cannot be obtained for both Econ 4710 and Econ 5710. Prerequisite: Econ 2100.

ECON 5720 Advanced International Finance (LEC 3.0)
Examination of the international monetary system, the Balance of Payments, the foreign exchange market, futures and options markets; foreign exchange and other risk management for firms, financing from a global perspective and direct foreign investment. This course is an advanced version of Econ 4720, and will include additional research and project assignments. Credit cannot be obtained for both Econ 4720 and Econ 5720. Prerequisite: Econ 2200.

ECON 5820 Advanced Labor Economics (LEC 3.0)
Labor as a factor of production, collective bargaining, trade unionism, labor legislation, from the viewpoint of public policy. This course is an advanced version of Econ 4820, and will include additional research and project assignments. Credit cannot be obtained for both Econ 4820 and Econ 5820. Prerequisite: Econ 2100 or Econ 2200.

ECON 6000 Special Problems (IND 0.0-6.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

ECON 6010 Seminar (RSD 0.0-6.0)
Discussion of current topics.

ECON 6337 Financial Mathematics II (LEC 3.0)
Continuation of Math 5737/Econ 5337. Topics include martingales and measures, stopping times, discrete and continuous time finance, Brownian motion, Ito calculus, stochastic differential equations, Black-Scholes-Merton formula, numerical procedures. Prerequisite: Math 5737 or Econ 5337. (Co-listed with Math 6737).

ECON 6440 Advanced Environmental and Natural Resource Economics (LEC 3.0)
Optimum use of renewable and non-renewable resources, public goods and common resources, externalities, and quality of the environment; emphasis on public policy related to environmental and natural resource economics. As an advanced version of Econ 4440, it will include additional research assignments. Credit can't be earned for both Econ 4440 and 6440. Prerequisite: Econ 2100.

ECON 6540 Advanced Energy Economics (LEC 3.0)
Market structures. World resource development. Supply and demand analysis on energy production and consumption within domestic and global settings. This course is an advanced version of Econ 4540, and will include additional research and project assignments. Credit cannot be obtained for both Econ 4540 and Econ 6540. Prerequisite: Econ 2100.

ECON 6641 Advanced Foundations of Sustainability (LEC 3.0)
This interdisciplinary course applies an entrepreneurial mindset to the environmental and social opportunities and challenges facing the global community. Topics are examined from multiple perspectives; nonprofit, hybrid, and for-profit organizations. Written case studies required. Research project required. Prerequisites: Econ 6642.

ECON 6642 Global Eco- and Social-preneurship and Innovation (LEC 3.0)
This interdisciplinary course applies an entrepreneurial mindset to the environmental and social opportunities and challenges facing the global community. Topics are examined from multiple perspectives; nonprofit, hybrid, and for-profit organizations. Written case studies required. Research project required. Prerequisites: Econ 6642.

ECON 6643 Advanced Ethical Problems in a Global Environment (LEC 3.0)
Focuses on the international dimension of ethics including corporate responsibility from economic, social, and environmental perspectives. It addresses the ethical challenges of decision-making, stakeholder engagement, and governance at micro-(personal), and meso-(org), and macro-(systems) levels. Case studies will be included as part of the course.