

842. Managerial Economics and Public Policy
Fall, 3(3-0)

R: Open only to MBA students in the Advanced Management Program.

Analysis of the firm. Demand and revenues, optimal production, cost minimization, supply, profitability, and pricing. Competitive forces and public policies in the firm's regional and international markets.

QA: EC 803

850. Growth, Development, and Human Resources
Fall, 3(3-0)

P: EC 805 or EC 812A.

Theory and measurement of long-run growth. Population growth, technological change, capital formation, urbanization, entrepreneurship, and structural change.

QP: EC 805A or EC 812A QA: EC 850, EC 851

851. Domestic and Foreign Development Policies
Spring, 3(3-0)

P: EC 805, EC 809; or EC 812A, EC 813A.

Problems of economic development. Market formation, financial markets and monetary policy, fiscal policy, investment criteria and externalities, trade policy, foreign capital, international disequilibrium.

QP: EC 805A, EC 809 or EC 812A, EC 813A QA: EC 852

852. Macroeconomics
Spring, 3(3-0)

R: Open only to MBA students in the Advanced Management Program.

Determinants of the national income, employment, and inflation. National income accounting. Analysis of business fluctuations, fiscal and monetary policy, international trade, and capital flows.

QA: EC 804

860. Market Structure and Behavior
Fall, 3(3-0)

P: EC 805 or EC 812A.

The consequences of concentration and entry conditions. Theory of the firm as it relates to size, scope, integration, motivation. Static market behavior. Antitrust treatment of cartels and mergers.

QP: EC 805A or EC 812A QA: EC 821A

861. Dynamic Market Behavior and Performance
Spring, 3(3-0)

P: EC 805 or EC 812A.

Theoretical and empirical treatments of dynamic aspects of industry behavior. Strategic behavior, predation, and antitrust treatment. Research, development, innovation. Government controls. Public utilities and regulation.

QP: EC 805A or EC 812A QA: EC 821C

880. Labor Economics I
Fall, 3(3-0)

P: EC 805 or EC 812A.

Labor supply and measurement of the labor force. Labor demand. Mobility, turnover, and migration. Equalizing wage differentials. Trade union growth, goals, bargaining and effects.

QP: EC 805A or EC 812A QA: EC 857A

881. Labor Economics II
Spring, 3(3-0)

P: EC 805, EC 809; or EC 812A, EC 813A.

Theories of human capital. Internal labor markets and the economics of personnel. Economics of discrimination. Wage distributions. Job search and matching. Macroeconomic issues.

QP: EC 805A, EC 809 or EC 812A, EC 813A QA: EC 857C

895. Graduate Reading in Economics

Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.

Faculty guided research projects.

QA: EC 895

911. Strategic Behavior in Economic Environments
Fall, 3(3-0)

P: EC 812B.

Topics in cooperative and non-cooperative game theory. Applications include: oligopoly and bargaining theories, strategic voting and principal agent models, endogenous coalition formation, signalling, strategic trade, and auctions theories.

QP: EC 812C QA: EC 900

912. Risk, Uncertainty and Information
Spring, 3(3-0)

P: EC 812A.

Effects of risk in economic environments. Topics include: expected utility theory, risk aversion, stochastic dominance, mean-variance models, state preference models, general equilibrium models with risk, information theory.

QP: EC 812A QA: EC 900

999. Doctoral Dissertation Research

Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course.

R: Open only to Ph.D. students in Economics.

QA: EC 999

**EDUCATIONAL
ADMINISTRATION EAD**

**Department of Educational
Administration
College of Education**

315. Student Leadership Training

Fall, Spring, 3(2-2)

Student leadership role, skills, and technique, consistent with the principles and demands of a democratic multicultural society.

QA: EAD 415A, EAD 415B

800. Organization Theory in Education

Fall, Spring, Summer. 3(3-0)

Organizational theory and research applied to educational administration. Topics include comparative organization settings, external environments, organizational effectiveness, and ethics.

801. Leadership and Organizational Development

Spring, Summer. 3(3-0)

Interaction of leadership with organizational culture and development within a variety of educational organizations.

QA: EAD 862, EAD 951F

802. Staff and Professional Development

Spring, 3(3-0)

Staff and professional development interventions in educational organizations.

QA: EAD 874A, EAD 874B

803. Planning, Budgeting, and Evaluation

Spring, Summer of even-numbered years.

3(3-0)

Planning, budgeting, and evaluation in educational organizations. Topics include needs assessment, funding sources, and processes for estimating costs and revenues.

QA: EAD 851D, EAD 971B

804. Administration of Human Resources in Education

Fall, Summer. 3(3-0)

Tasks of personnel management in schools, colleges, and other educational organizations, including recruitment, selection, orientation, development, compensation, and evaluations. Focus on attracting and retaining a quality workforce in education.

QA: EAD 951E

813. Education, Development and Social Change

Spring of even-numbered years. 3(3-0)

Interdepartmental with Teacher Education.

Rise of modern systems of education in developed and developing countries. Education, the state, and national development. Colonial heritage, linkages, and globalization of educational development.

QA: EAD 805A, EAD 805B, EAD 805C

852A. Elementary and Middle School Administration

Fall, Summer. 3(3-0)

Administration and supervision of elementary and middle schools. Alternative organizational arrangements, curricula, and practices. Problems and strategies for improving K-8 education.

QA: EAD 852A

852B. Secondary School Administration

Fall, Summer. 3(3-0)

Administration and supervision of secondary schools. Alternative organizational arrangements, curricula, and practices. Problems and strategies for improving secondary schools.

QA: EAD 852B

853A. Legal, Fiscal, and Policy Environment of Schools

Fall, Summer. 3(3-0)

External determinants of school policy and practice. Nature of policy-making process. History of school finance. Effect of fiscal policy on education. Equity issues. Impact of constitutional, legislative, and administrative requirements.

QA: EAD 852G, EAD 852D

853B. Schools, Families, and Communities

Fall, Summer of odd-numbered years.

3(3-0)

Comparative and historical analysis of education within the broader social context. Families, communities, and the private sector. Social problems, social policies, and school practice.

853C. Instructional Supervision

Spring, Summer. 3(3-0)

P: EAD 800.

Supervision and evaluation of teaching and learning, and strategies for improvement of K-12 education.

QA: EAD 852C

855. Research in Educational Administration

Fall, Spring, Summer. 3(3-0)

P: CEP 822, EAD 800.

Applications of research techniques to educational organizations. Developing research proposals, conducting research, and writing formal papers.

QP: EAD 851A, EAD 851B, CEP 803 QA: EAD 855

860. The Concept of the Learning Society

Fall, Summer. 3(3-0)

Lifelong education in the United States and other countries. origins, forms, purposes, sponsors, content, and theory.

QA: EAD 860

861A. Adult Learning

Fall, Summer. 3(3-0)

P: EAD 860.

Adult development and life transitions. Motivation and barriers to participation. Theories of adult learning.

QA: EAD 861

861B. Strategies for Teaching Adults

Spring. 3(3-0)

P: EAD 861A.

Assessing program goals, setting expectations, developing resources, choosing strategies, and evaluating outcomes.

QA: EAD 864, EAD 964, EAD 872A

861C. Literacy in the Community and Workplace

Spring of even-numbered years. 3(3-0)

Psychological, sociological, economic and political implications of illiteracy. Literacy campaigns and specific approaches to reducing illiteracy. Workforce literacy programs and techniques in schools, business, industry and labor.

QA: EAD 866A, EAD 866B

862B. Adult Career Development

Spring. 3(3-0)

Personal, social and economic aspects of careers. Theories, practices and systems available to professionals in assisting client groups.

QA: EAD 869A, EAD 869B

**Descriptions—Educational Administration
of
Courses**

- 870. Foundations of Postsecondary Education**
Fall. 3(3-0)
Historical, philosophical and social forces that shaped development of colleges and universities. Emphasis on higher education in the United States.
QA: EAD 870B
- 871A. Academic Programs and Instruction in Higher Education**
Spring of odd-numbered years. 3(3-0)
Curricular trends, teaching processes, and faculty roles in higher education.
- 871B. Collegiate Contexts for Teaching and Learning**
Fall of even-numbered years. 3(3-0)
P: EAD 800.
Individual, institutional, cultural, professional, and external environmental factors that shape teaching and learning at the college level. Strategies for improving learning.
QP: EAD 861 QA: EAD 872A
- 872. Legal Issues in Higher Education**
Spring. 3(3-0)
Legal aspects of administrative practice in institutions of higher education. Governance, academic freedom, due process, and anti-discrimination.
QA: EAD 970A
- 873. The College Student Experience**
Fall, Summer. 3(3-0)
Activities and environmental variables that can improve the college experience.
QA: EAD 870F
- 874A. Student Affairs in Collegiate Settings I**
Fall. 3(3-0)
History, development, philosophy, organization and administration of college student personnel as a profession. Needed services, programs and skills.
QA: EAD 873A, EAD 873B
- 874B. Student Affairs in Collegiate Settings II**
Spring. 3(3-0)
P: EAD 874A.
College students as members of groups. Peer and group influence. Impact of diversity on behavior. Student disciplinary philosophy and practice. Professional staff development.
QP: EAD 873A QA: EAD 873B, EAD 873C
- 881. Workshops in Educational Administration**
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
Laboratory experiences focused on common supervisory and administrative problems.
QA: EAD 881
- 882. Seminars in Educational Administration (MTC)**
Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Seminars in various fields in K-12 educational administration and in higher, adult, and lifelong education.
- 890. Independent Study**
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. Approval of department.
Individual study in an area of K-12 administration or higher, adult, and lifelong education.
- 894. Laboratory and Field Experiences**
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
Supervised graduate practica, observations, internships, or externships in K-12 administration and in higher, adult, and lifelong education.
QA: EAD 884, EAD 984
- 894A. Practicum in Student Affairs**
Fall, Spring, Summer. 2(1-3) A student may earn a maximum of 4 credits in all enrollments for this course.
P: EAD 874B. R: Open only to master's students in Student Affairs Administration. Approval of department.
Supervised work experience in student affairs.
QA: EAD 876A
- 899. Master's Thesis Research**
Fall, Spring, Summer. 1 to 9 credits. A student may earn a maximum of 15 credits in all enrollments for this course.
- 940. Organizational Analysis of K-12 Schooling**
Fall, Spring, Summer. 3(3-0)
P: EAD 800.
Theoretical perspectives on schools as organizations. Relationship of organization theory to administrative practice.
- 941. Administrative Behavior in Educational Organizations**
Spring. 3(3-0)
P: EAD 800.
Concepts and models of leadership, management, and organization as they apply to the administration of educational institutions.
QP: EAD 851A QA: EAD 851C
- 942. Economic Analysis in Educational Policy Making**
Spring of odd-numbered years. 3(3-0)
Interdepartmental with Teacher Education.
Economic effects of education. Economic analysis of policy issues in education. Alternative theoretical perspectives. Applications to the United States and other countries.
QA: TE 937
- 943. Politics of Education**
Fall of odd-numbered years. 3(3-0)
Education as a political enterprise. Interplay of federal relations, democratic principles, and contending sources of authority in shaping educational policy and practice.
- 944. Policy and Practice in Education**
Fall of odd-numbered years. 3(3-0)
Multiple conceptions of the relationship between policy and practice in K-12 education.
- 945. Comparative Analysis of School Effectiveness and Quality**
Spring of even-numbered years. 3(3-0)
Alternative conceptual and methodological approaches to the assessment of school effectiveness, with an emphasis on cross-national comparisons.
QA: EAD 911
- 951A. Educational Finance**
Spring, Summer of odd-numbered years). 3(3-0)
Political and economic contexts of educational finance. Role of government and policy criteria. Acquisition and distribution of public resources. Emerging issues in elementary and secondary education. Comparative and international analyses.
QA: EAD 951B
- 951B. Planning Change in K-12 Education**
Fall, , Summer of even-numbered years. 3(3-0)
Behavioral change processes in educational institutions. Concepts and methods that have been tested by laboratory and field experiences.
QA: EAD 951F
- 951C. Educational Law**
Spring, Summer. 3(3-0)
Legal aspects of school administration. Governance, compulsory attendance, student discipline, due process, search, free speech rights of students and teachers, church and state, and discrimination law.
QA: EAD 951C, EAD 852G
- 952A. Externship in Educational Administration**
Fall, Spring. 3(3-0) Given at various off-campus site. A student may earn a maximum of 21 credits in all enrollments for this course.
Current administrative problems and solution strategies in education.
QA: EAD 952A, EAD 952B
- 955A. Clinical Inquiry in Educational Administration**
Spring. 3(3-0)
R: Open only to graduate students in Department of Educational Administration.
Clinical approaches to problems of educational administration, with emphasis on the development of multiple analytic perspectives.
- 955B. Field Research Methods in Educational Administration**
Fall. 3(3-0)
Methods used in conducting field studies in educational organizations, with emphasis on interviews, observation, and participant observation.
QA: EAD 951H
- 960. Proseminar in Higher, Adult, and Lifelong Education**
Fall. 3(3-0)
R: Open only to graduate students in Higher, Adult, and Lifelong Education.
Academic and student administration and leadership. Adult learning. Central concepts and methods in the field of higher, adult, and lifelong education.
- 961. Seminar in Adult Learning**
Fall. 3(3-0)
P: EAD 861A R: Open only to doctoral students.
Dimensions of cognitive style and their application to various learning contexts. Personal theories of adult learning.
- 962. Education and Work**
Spring. 3(3-0)
Trends shaping the relationship between education and work in the United States and other countries.
QA: EAD 869D
- 963. Leadership in Postsecondary Education**
Spring of odd-numbered years. 3(3-0)
P: EAD 800.
Leadership as a complex social phenomenon in higher, adult, and lifelong educational settings. Theories of leadership as applied to education. Enhancing leadership diversity.
- 964. Women's Education and Professional Development**
Fall of even-numbered years. 3(3-0)
Gateways and barriers to women's achievement in education and their careers.
- 965. Diversity and Equity in Postsecondary Education**
Fall of even-numbered years. 3(3-0)
Promise, challenge, and management of diversity and equity in higher education. Analysis of data and policy. Management responses and strategies.
- 967. Policy Challenges in Postsecondary Education**
Spring of odd-numbered years. 3(3-0)
P: EAD 853A.
Classic and contemporary policy issues such as access, finance, excellence, and purpose. Structures for policy-making. Agencies at federal, state, and local levels.
- 970A. Administration and Governance of Higher Education**
Spring of even-numbered years. 3(3-0)
P: EAD 800.
Principles and patterns of organization and governance characteristic of colleges and universities. Administrative, trustee, faculty, and student roles.
- 970B. The Community College**
Spring of even-numbered years. 3(3-0)
History, philosophy, organization, and role of the community college in higher education. Emphasis on programs and services in comprehensive public community colleges.
QA: EAD 971D
- 971A. Institutional Research and Improvement**
Fall of odd-numbered years. 3(3-0)
R: Open only to graduate students in College of Education.
Tools and methods used to conduct analyses of institutional management and policy issues.

971B. Planning, Evaluation, and Decision Making in Post-secondary Education
Spring of even-numbered years. 3(3-0)

Analysis of planning, evaluation, and decision making in the leadership and management of post-secondary institutions. Integration of program, personnel, facility, and enrollment planning related to factors such as budgeting and accreditation.
QA: EAD 971C

971C. Higher Education Finance
Spring of odd-numbered years. 3(3-0)

Revenue sources of institutions of higher education. Restrictions and conditions placed upon funds. Administrative structures used to obtain and manage funds.
QA: EAD 970B

971D. Institutional Advancement in Higher Education
Fall of odd-numbered years. 3(3-0)

Issues and strategies affecting institutional development. Governmental relations, admissions, alumni relations, and general administration.
QA: EAD 870C, EAD 870J

990. Independent Study

Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
Advanced individual study in an area of K-12 administration or higher, adult, and lifelong education.

991A. Special Topics in K-12 Administration

Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.

991B. Special Topics in Higher, Adult, and Lifelong Education

Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.

994. Laboratory and Field Experience in Educational Administration

Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Open only to doctoral students.
Supervised advanced graduate practice, observations, internships, or externships in K-12 administration and in higher, adult, and lifelong education.

995. Research Practicum in Educational Administration

Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course.
R: Open only to doctoral students. Approval of department.
Supervised research practicum. Design, execution, analysis, presentation, critique, and revision of research projects.

999. Doctoral Dissertation Research

Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course.
R: Open only to Ph.D. students.

**ELECTRICAL
ENGINEERING**

EE

**Department of Electrical
Engineering
College of Engineering**

200. Electric Circuits
Fall, Spring. 4(4-0)

P: CPS 130 or CPS 131 or CPS 230; MTH 133. R: Open only to Engineering students.
Resistive circuits. Loop and nodal analysis. Network theorems. Capacitor and inductor circuits. Transient analysis. Forced response. Sinusoidal steady-state response. Frequency response. Introduction to computer-aided analysis.
QP: MTH 113 QA: EE 300, EE 301

302. Electronic Circuits

Fall, Spring. 4(3-3)
P: EE 200. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.
Volt-ampere characteristics of diodes and transistors. SPICE modeling. Differential, multistage and integrated circuit amplifiers. High frequency effects. Electronic test equipment and verification of principles.
QP: EE 301, MTH 215 QA: EE 302, EE 303, EE 304

305. Electromagnetic Fields and Waves I
Fall, Spring. 3(3-0)

P: MTH 235, PHY 184. R: Open only to Electrical Engineering, and Computer Engineering majors.
Vector analysis. Static electric field and scalar potential. Dielectric materials. Electric force and energy. Potential problems. Steady currents, magnetic field and vector potential. Magnetic materials and circuits. Magnetic force and torque.
QP: MTH 310, PHY 288 QA: EE 305, EE 306

306. Electromagnetic Fields and Waves II
Spring, Summer. 4(3-3)

P: EE 305. R: Open only to Electrical Engineering and Computer Engineering majors.
Faraday's law. Maxwell's equations. EM energy conservation. Wave equations and EM waves. Transmission lines. Transient waves. Travelling and standing waves. EM plane waves. EM radiation and antennas.
QP: EE 305, EE 306 QA: EE 307, EE 308

320. Energy Conversion and Power Electronics
Fall, Spring. 3(3-0)

P: EE 302, EE 305. R: Open only to Electrical Engineering and Computer Engineering majors.
Power and energy. Magnetics and transformers. Elementary and induction machines. Power semiconductors. Controlled rectifiers and inverters. Power supplies and motor drives.
QP: EE 301, EE 306 QA: EE 320

330. Digital Logic Fundamentals
Fall, Spring, Summer. 3(3-0)

P: CPS 130 or CPS 131 or CPS 230. R: Open only to College of Engineering majors.
Switching algebra, combinational logic, minimization. Programmable logic devices. Sequential system fundamentals, elements, circuits. Arithmetic operations and circuits. Memory elements and systems. Hierarchical structures. Design problems.
QP: CPS 251 QA: EE 330

331. Microprocessors and Digital Systems
Fall, Spring. 4(3-3)

P: CPS 230, EE 330. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors. Not open to students with credit in CPS 320.
Microcomputers. Microprocessor architecture. Addressing modes. Assembly language programming. Parallel and serial input and output. Interfacing to memory. Interrupts. Direct Memory Access. Coprocessors. Peripheral device controllers. Applications, design
QP: EE 330 QA: CPS 311

345. Electronic Instrumentation and Systems
Fall, Spring, Summer. 3(2-3)

P: MTH 235, PHY 184. R: Open only to College of Engineering majors except Electrical Engineering and Computer Engineering.
Electrical and electronic components, circuits and instruments. Circuit laws and applications, frequency response, operational amplifiers, semi-conductor devices, digital logic, counting circuits.
QP: PHY 288 QA: EE 345

360. Signals and Linear Systems
Fall, Spring. 4(4-0)

P: EC 200, MTH 235. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.
Continuous and discrete signals and systems. Convolution, impulse response, system classifications, state variables, differential and difference equations. Fourier series, Fourier transform, Laplace transform. Z-transform. Transfer functions and stability.
QP: MTH 310 QA: EE 315, EE 417, EE 355

410. Digital Electronics

Fall, Spring. 3(3-0)
P: EE 302, EE 330. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.
Transistor switch models. Device simulation models. Logic family characteristics. Latches, flip-flops, timers, memory circuits, standard cells. Gate arrays, programmable logic devices.
QP: EE 330, EE 302 QA: EE 410

411. Electronic Design Automation
Spring. 3(3-0)

P: CPS 320 or EE 331; EE 410. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.
Electronic design hierarchy and the role of methodology. Application specific integrated circuits. Hardware descriptive languages. Behavioral and structural models. Semicustom design. Design algorithms. Design project, presentation and reports.
QP: CPS 311, EE 410 QA: EE 411

413. Control Systems
Fall, Spring. 3(3-0)

P: EE 360. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.
Analysis and design of control systems using transfer functions and state variable methods. Design of digital controllers. Microprocessor implementation.
QP: EE 315, EE 355 QA: EE 413, EE 415

418. Algorithms of Circuit Design
Fall. 3(3-0)

P: EE 302. R: Open only to Electrical Engineering and Computer Engineering majors.
Design of analog electrical circuits, filter functions, ladder synthesis, inductor simulation. Vector Newton-Raphson method. Lossy inductance and capacitance. Statistical tolerance analysis. Optimization by multi-dimensional search. Software algorithms.
QP: EE 302 QA: EE 418

421. Power System Analysis
Spring. 4(3-3)

P: EE 320. R: Open only to Electrical Engineering and Computer Engineering majors.
Synchronous machines: models and measurements of power components. Symmetrical components. Short circuit analysis and equipment protection. Load flow. Voltage and frequency control. Operation and planning of power systems.
QP: EE 320 QA: EE 421, EE 423

435. Electromagnetic Waves and Applications
Fall. 4(3-3)

P: EE 306. R: Open only to Electrical Engineering and Computer Engineering majors.
Open and closed-boundary waveguides. Resonators. Microwave circuit theory. Scattering parameters. Electromagnetic radiation. Properties of antennas. Wave propagation. Measurement of antenna characteristics. Computer-aided design and testing.
QP: EE 307, EE 308 QA: EE 435, EE 436, EE 438

457. Statistical Communication Systems
Spring. 4(3-3)

P: EE 360, STT 351. R: Open only to Electrical Engineering and Computer Engineering majors.
Representation, processing, filtering of random signals. System performance with noise. Optimal digital communication systems. Modulation, detection, coding, information. System design applications in telecommunications, radar, signal processing.
QP: EE 355, EE 456 or STT 441 or STT 351 QA: EE 457, EE 467

466. Digital Signal Processing and Filter Design
Fall. 3(3-0)

P: EE 360. R: Open only to seniors and graduate students in Electrical Engineering and Computer Engineering.
Discrete Fourier transforms, sampling theorem, circular convolution, Z-transforms. Design of infinite impulse resistance filters using prototypes and algorithmic methods. Design of finite impulse resistance filters by windowing, frequency sampling.
QP: EE 355, EE 315 QA: EE 466