827. Economic Forecasting
Spring. 2(2-0) P: MBA 814. R: Open only to MBA students.
Concepts, sources, measurement, and forecasts of economic data. Forecasting techniques. Time series analysis and economic models. Uses of economic models and forecasts in business decision making.

829. The Economics of Environmental Resources
Fall. 3(3-0) Interdepartmental with Agricultural Economics; Forestry; Park, Recreation and Tourism Resources; and Resource Development. Administered by Agricultural Economics.
Economic principles related to environmental conflicts and public policy alternatives. Applications to water quality, land use, conservation, development, and global environmental issues.

830. Advanced Macroeconomics and Monetary Theory
Fall. 3(3-0) P: EC 812B; EC 813B.
General equilibrium models of monetary economies. Money and growth. Monetary and financial models of the business cycle. Hyperinflation. Bubbles, sunspots, cycles, and multiple equilibria.

831. Problems in Monetary Theory and Policy
Spring. 3(3-0) P: EC 809 or EC 813A; EC 820.
Empirical models of money, output, prices and interest rates. Goals and techniques of monetary policy.

835. Public Expenditures
Fall. 3(3-0) P: EC 805 or EC 812A.
Allocative and distributional effects of public expenditure. Public goods and externalities. Selected topics in public expenditure analysis such as cost-benefit analysis, fiscal federalism, mechanism design, public choice, general equilibrium models.

836. Public Revenues
Spring. 3(3-0) P: EC 805 or EC 812A.
Theory of taxation. Allocative and distributional effects of taxation, user charges, and deficit finance. Positive and normative aspects. General equilibrium models. Dynamic models. Issues of fiscal federalism.

840. International Trade: Theory and Commercial Policy
Fall. 3(3-0) P: EC 805 or EC 812A.
Commodity composition of trade. Welfare and distributional effects. Measures such as tariffs, quotas, and export subsidies. International economic policy. Theory and practice of regional economic integration.

841. Exchange Rates and Capital Flows
Spring. 3(3-0) P: EC 805, EC 809; or EC 812A, EC 813A.
The balance of payments statement. Mechanisms of balance of payments adjustment. Exchange rate determination. Domestic policies under alternative exchange rate regimes. Regional monetary integration. The international currency system.

842. Managerial Economics and Public Policy
Fall. 3(3-0) Fall: Troy Management Education Center. 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.

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.

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.

852. Macroeconomics in a Global Economy
Spring. 3(3-0) Spring: Troy Management Education Center. R: Open only to MBA students in the Advanced Management Program.
Measurement, determinants, and forecasting of national income, employment, interest rates, and inflation. Analysis of business fluctuations, fiscal and monetary policy, international trade, and capital flows.

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.

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.

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.

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.

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.

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.

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.

923. Advanced Environmental and Resource Economics
Spring of even years. 3(3-0) Interdepartmental with Agricultural Economics; Forestry; Park, Recreation and Tourism Resources; and Resource Development. Administered by Agricultural Economics. P: (AEC 829 and EC 805)
Advanced economic theory of environmental management and policy. Treatment of externalities and market and non-market approaches to environmental improvement. Topics in conservation and sustainable economic growth. Applications to research and policy.

925. Environmental and Resource Economics Research
Spring of odd years. 3(3-0) Interdepartmental with Agricultural Economics; Forestry; Resource Development; and Park, Recreation and Tourism Resources. Administered by Agricultural Economics. P: (AEC 829 and EC 805)
Topics such as contingent or non-market valuation, institutional analysis, pollution prevention, environmental quality and location, recreational demand modeling, and environmental risk management. Research process in environmental and resource economics.
SA: AEC 991H

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.

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.

451. Models of Special Education Administration and Services
Spring. 3(2-2) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Counseling, Educational Psychology and Special Education. R: Open only to students admitted to the teacher certification program in emotional impairment or learning disabilities or to master's students in the Special Education major.
Application of theory and research to special education program design and implementation.
SA: CEP 851, EAD 851

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.

802. Staff and Professional Development
Spring. 3(3-0)
Staff and professional development interventions in educational organizations.

803. Planning, Budgeting, and Evaluation
Spring. 3(3-0)
Planning, budgeting, and evaluation in educational organizations. Topics include needs assessment, funding sources, and processes for estimating costs and revenues.

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.

813. Education, Development and Social Change
Spring of odd 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.

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.

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.

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.

853B. Schools, Families, and Communities
Fall. 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.

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.

858. Special Education Law
Fall of even years. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Counseling, Educational Psychology and Special Education. R: Open only to seniors or graduate students.
Analysis of State and Federal regulations, guidelines and court decisions related to special education and examination of their impact.

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.

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.

861B. Strategies for Teaching Adults
Spring. 3(3-0) P: EAD 861A.
Assessing program goals, setting expectations, developing resources, choosing strategies, and evaluating outcomes.

861C. Literacy in the Community and Workplace
Spring of odd 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.

862A. Training in Industry
Fall. 3(3-0) P: EAD 860.
Factors influencing the development of education and training in business and industry. Relevance of training and development models to adult educators.

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.

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.

871A. Academic Programs and Instruction in Higher Education
Spring. 3(3-0)
Curricular trends, teaching processes, and faculty roles in higher education.

871B. Collegiate Contexts for Teaching and Learning
Fall. 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.

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.

873. The College Student Experience
Fall, Summer. 3(3-0)
Activities and environmental variables that can improve the college experience.

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.

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.

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.

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. R: 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.

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.

895. Research Ethics
Summer. 1(1-0) Interdepartmental with Kinesiology; Teacher Education; and Counseling, Educational Psychology and Special Education. Administered by Kinesiology. R: Open only to graduate students in the Department of Counseling, Educational Psychology and Special Education or Department of Educational Administration or Department of Kinesiology or Department of Teacher Education.
Identifying and resolving ethical problems in research, including issues related to collegial interactions; authorship, publication, and reviewing practices; data management; ownership of data and intellectual property; conflicts of interest; protectionof human and animal subjects; and lab safety and compliance.

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.

925. Policy and Practice in Education
Fall of odd years. 3(3-0)
Multiple conceptions of the relationship between policy and practice in K-12 education.
SA: EAD 944

931. Qualitative Methods in Educational Research
Fall. 4(4-0) Interdepartmental with Teacher Education; and Counseling, Educational Psychology and Special Education. Administered by Teacher Education. P: CEP 930. R: Open only to doctoral students. Approval of department.
Multiple traditions of qualitative research in education. Approaches to theory, research questions and design, data collection and analysis, and reporting. Ethical issues. Appraising qualitative research.

940. Organizational Analysis of Education
Spring. Summer of odd years. 3(3-0) P: (EAD 800)
Theoretical perspectives on schools and universities as organizations. Relationship of organization theory to administrative practices.

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.

942. Economic Analysis in Educational Policy Making
Spring of even 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.

943. Politics of Education
Fall of odd 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.

945. Comparative Analysis of School Effectiveness and Quality
Spring of odd years. 3(3-0)
Alternative conceptual and methodological approaches to the assessment of school effectiveness, with an emphasis on cross-national comparisons.

951A. Educational Finance
Spring. 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.

951B. Planning Change in K-12 Education
Fall. 3(3-0)
Behavioral change processes in educational institutions. Concepts and methods that have been tested by laboratory and field experiences.

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.

952A. Externship in Educational Administration
Fall, Spring. 3(3-0) Fall: Given only at various off-campus sites. Spring: Given only at various off-campus sites. A student may earn a maximum of 21 credits in all enrollments for this course.
Current administrative problems and solution strategies in education.

955B. Field Research Methods in Educational Administration
Spring. 3(3-0)
Methods used in conducting field studies in educational organizations, with emphasis on interviews, observation, and participant observation.

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.

963. Leadership in Postsecondary Education
Spring of even 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 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 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 even years. 3(3-0) P: EAD 853A.
Classic and contemporary policy issues such as access, finance, excellence, and purpose. Structures for policymaking. Agencies at federal, state, and local levels.

970A. Administration and Governance of Higher Education
Spring of odd 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.

971B. Planning, Evaluation, and Decision Making in Post-secondary Education
Spring of odd 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.

971C. Higher Education Finance
Spring of even 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.

971D. Institutional Advancement in Higher Education
Fall of odd years. 3(3-0)
Issues and strategies affecting institutional development. Governmental relations, admissions, alumni relations, and general administration.

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.

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.
Special topics in the field of higher, adult and lifelong education.

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 practica, 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 AND COMPUTER ENGINEERING ECE

Department of Electrical and Computer Engineering
College of Engineering

200. Electric Circuits
Fall, Spring. 4(4-0) P: (CSE 131 or CSE 230) and (MTH 234 or LBS 220) and (MTH 235 or concurrently or LBS 119 or concurrently)
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.
SA: EE 200

302. Electronic Circuits
Fall, Spring. 3(3-0) P: (ECE 200) ECE 200. R: Open only to students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering.
Volt-ampere characteristics of diodes and transistors. SPICE modeling. Differential, multistage and integrated circuit amplifiers. High frequency effects.
SA: EE 302

303. Electronics Laboratory
Fall, Spring. 1(0-3) P: (ECE 200) R: Open only to students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering. C: ECE 302 concurrently.
Electronic test equipment and measurement fundamentals. Experimental verification of topics covered in EE 200 and EE 302.
SA: EE 303

305. Electromagnetic Fields and Waves I
Fall, Spring. 3(3-0) P: (MTH 235 or LBS 119) and (PHY 184) R: Open only to students in the Department of Electrical and Computer Engineering.
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.
SA: EE 305

306. Electromagnetic Fields and Waves II
Spring, Summer. 3(3-0) P: (ECE 305)
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.
SA: EE 306

307. Electromagnetic Fields and Waves Laboratory
Spring, Summer. 1(0-3) P: (ECE 306 or concurrently)
Experimental investigation of topics in electromagnetic fields and waves. Experimental verification of material in EE 306.
SA: EE 307

320. Energy Conversion and Power Electronics
Fall, Spring. 3(3-0) P: (ECE 303 and ECE 305)
Power and energy. Magnetics and transformers. Elementary and induction machines. Power semiconductors. Controlled rectifiers and inverters. Power supplies and motor drives.
SA: EE 320

330. Digital Logic Fundamentals
Fall, Spring, Summer. 3(3-0) P: (CSE 131 or CSE 230)
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.
SA: EE 330

331. Microprocessors and Digital Systems
Fall, Spring. 3(3-0) P: (ECE 330) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering. Not open to students with credit in CSE 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.
SA: EE 331

332. Microprocessors and Digital Systems Laboratory
Fall, Spring. 1(0-3) P: (ECE 330) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering. Not open to students with credit in CSE 320. C: ECE 331 concurrently.
A projects laboratory in a digital-logic design and microprocessor-based systems.
SA: EE 332

345. Electronic Instrumentation and Systems
Fall, Spring, Summer. 3(2-3) P: (MTH 235 or LBS 119) and (PHY 184) and completion of Tier I writing requirement. R: Open only to students in the College of Engineering with the exception of students in the Department of Electrical and Computer Engineering.
Electrical and electronic components, circuits and instruments. Circuit laws and applications, frequency response, operational amplifiers, semiconductor devices, digital logic, counting circuits.
SA: EE 345

360. Signals and Linear Systems
Fall, Spring. 4(4-0) P: (ECE 200) and (MTH 235 or LBS 119) R: Open only to students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering.
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.
SA: EE 360

381. Professionalism, Communication and Ethics (W)
Fall, Spring. 1(1-0) P: (ECE 303 or concurrently) and completion of Tier I writing requirement. R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering.
Examination of issues in professionalism, ethics, and technical communications related to electrical and computer engineering.
SA: EE 481

410. Digital Electronics
Fall, Spring. 3(3-0) P: (ECE 303 and ECE 330) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering.
Transistor switch models. Device simulation models. Logic family characteristics. Latches, flip-flops, timers, memory circuits, standard cells. Gate arrays, programmable logic devices.
SA: EE 410