911**. *Strategic Behavior in Economic Environments
Fall. 3(3-0)
P: EC 812B R: Graduate
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 R: Graduate
Analysis of the 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. May reenroll for a maximum of 99 credits.
R: Doctoral Economics

QA: EC 999

EDUCATIONAL ADMINISTRATION EAD

315**. *Student Leadership Training
Fall, Spring. 3(2-2)
R: Undergraduate
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
Fall, Spring, Summer. 3(3-0)
R: Graduate status
Organizational theory and research applied to educational administration.

801**. *Leadership and Organizational Development
Spring, Summer. 3(3-0)
R: Graduate students
Interaction of leadership with organizational culture and development.
QA: EAD 862 EAD 951F

802**. *Staff and Professional Development
Spring. 3(3-0)
R: Graduate students
Staff and professional development interventions within the context of educationally oriented organizations.
QA: EAD 874A EAD 874B

803**. *Planning, Budgeting, and Evaluation
Spring. 3(3-0)
R: Graduate students
Major functions encountered by administrators in educational organizations: planning, budgeting, and evaluation.
QA: EAD 851D EAD 971B

804**. *Human Resources Management in Education
Fall, , Summer. 3(3-0)
R: Graduate students
Recruitment, selection, orientation, training, salary and fringe benefits, morale, negotiations, and quality of work life in educational organizations.
QA: EAD 951E

805**. *Education, Development, and Social Change
Spring of odd-numbered years. 3(3-0)
Interdepartmental with the Department(s) of Teacher Education.
R: Graduate status
Rise of modern systems of education in developed and developing countries. Education, the state, and national development. Linkages, colonial heritage, and globalization of educational development.
QA: EAD 805A EAD 805B EAD 805C

852A**. *Elementary and Middle School Administration
Fall, , Summer. 3(3-0)
R: Graduate student
Administration and supervision of elementary and middle schools. Alternative organizational arrangements, curricula, practices, problems and strategies for improving K-8 schools.
QA: EAD852A

852B**. *Secondary School Administration
Fall, , Summer. 3(3-0)
R: Graduate student
Administration and supervision of secondary schools. Alternative organizational arrangements, curricula, practices, problems and strategies for improving secondary schools.
QA: EAD 852B

853B**. *Schools, Families, and Communities
Fall. 3(3-0)
R: Graduate student
Comparative and historical analyses of education in and out of schools and within the broader social context. Families, communities, and the private sector. Relationships among social problems, social policies, and school practice.

853C**. *Instructional Supervision
Spring, Summer. 3(3-0)
P: EAD 800 R: Graduate student
Instructional supervision in K-12 schools. Supervision and evaluation of teaching and learning. Strategies for improvement of K-12 education.
QA: EAD 852C

860**. *Introduction to the Learning Society
Fall, , Summer. 3(3-0)
R: Graduate students
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)
R: Graduate students
Conceptions of adult development and life transitions. Adult motivation and barriers to participation. Theories of adult learning.
QA: EAD 861

861B**. *Strategies for Teaching Adults
Spring. 3(3-0)
P: EAD 860 and EAD 861A R: Graduate students
Strategies for teaching adults including assessing program goals, setting expectations, developing resources, choosing strategies, and evaluating outcomes.
QA: EAD 864 EAD 964 EAD 872A

861C**. *Basic Skills in the Community and Workplace
Spring of odd-numbered years. 3(3-0)
R: Graduate students
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

862A**. *Training in Industry
Fall. 3(3-0)
P: EAD 860 R: Graduate students
Factors influencing the development of education and training in business and industry. Relevance of training and development models to adult educators.
QA: EAD 869C

862B**. *Adult Career Development
Spring. 3(3-0)
R: Graduate students
Personal, social and economic impact of careers. Theories, practices and systems available to professionals in assisting client groups in the career development process.
QA: EAD 869A EAD 869B

870**. *Foundations of Postsecondary Education
Fall. 3(3-0)
R: Graduate
Growth and development of colleges and universities. Major historical, philosophical and social forces that shaped their development. Emphasis on the development of higher education in the United States
QA: EAD 870B

871B**. *Collegiate Contexts for Teaching and Learning
Spring of odd-numbered years. 3(3-0)
P: EAD 800, EAD 861A R: Graduate students
Individual, institutional, cultural, professional, and external environmental factors that shape collegiate teaching and learning. Administrative and organizational strategies for improving learning.
QP: EAD 861 QA: EAD 872A

872**. *Legal Issues in Higher Education
Spring. 3(3-0)
R: Graduate students
Legal aspects of administrative practice in institutions of higher education including governance, academic freedom, due process, and anti-discrimination.
QA: EAD 970A

873**. *The College Student Experience
Fall. 3(3-0)
R: Graduate students
Impact of higher education on college students. Activities and environmental variables which can improve the collegiate experience.
QA: EAD 870F

874A**. *Student Affairs in Collegiate Settings I
Fall. 3(3-0)
R: Graduate students
History, development, philosophy, organization and administration of college student personnel as a profession. The college student as an individual. Services, programs and skills needed in the profession.
QA: EAD 873A EAD 873B

874B**. *Student Affairs in Collegiate Settings II
Spring. 3(3-0)
P: EAD 874A R: Graduate students
College students as members of groups. Peer and group influence, including the impact of diversity on behavior. Student disciplinary philosophy, and practice. Professional development of student affairs staff.
QP: EAD 873A QA: EAD 873B EAD 873C

894A**. *Practicum in Student Affairs
Fall, Spring. 2(1-3) May reenroll for a maximum of 4 credits.
R: MA program Education Student Affairs
Supervised work experience in student affairs.
QA: EAD 876A

940*. ***Organizational Analysis of K-12 Schooling***
Fall. 3(3-0)
P: EAD 800 R: Graduate student
Theoretical perspectives on schools as organizations. Relationship of organization theory to administrative practice in K-12 schooling.

943*. ***Politics of Education***
Fall of odd-numbered years. 3(3-0)
R: Graduate
Education as a political enterprise. Interplay of federal relations, democratic principles, and contending sources of authority in shaping educational policy and practice.

951B*. ***Educational Finance***
Spring. 3(3-0)
R: Graduate
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

951F*. ***Planning Change in K-12 Education***
Fall. 3(3-0)
R: Graduate
Behavioral change processes in educational institutions. Concepts and methods tested by laboratory and field experiences.
QA: EAD 951F

ELECTRICAL ENGINEERING EE

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. 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. 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 306 EE 307 EE 308

320*. ***Energy Conversion and Power Electronics***
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. 4(3-3)
P: CPS 230, EE 330. R: Open only to Electrical Engineering and Computer Engineering 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: E E 330 QA: CPS 311

345. ***Electronic Instrumentation and Systems***
Fall, Spring. 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: MTH 235. R: Open only to Electrical Engineering and Computer Engineering 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. 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***
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 algorith
QP: EE 302 QA: EE 418

421*. ***Power System Analysis***
Spring. 4(3-3)
P: EE 320. R: Open only to Electrical 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 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***
Fall. 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 456ORSTT 441OR QA: EE 457 EE 467

466*. ***Digital Signal Processing and Filter Design***
Spring. 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