on classical followers of Smith, Marx, 19th century positivism and socialism, the marginal revolution.

7799 School Counseling Techniques (3) May be taken for a max. of 6 hrs. of credit.

8900 Pre-research Dissertation (1-9) May be repeated for credit, except for a max. of 9 hrs. of credits.

9000 Dissertation Research (1-12 per sem.) 7'U'U grading.

EDUCATION • EDUC

2000 Special Topics in Education (1-3) Prereq.: consent of instructor. May be taken for a max. of 9 hrs. of credit. Methods, trends, and issues in education.

EDUCATIONAL LEADERSHIP, RESEARCH, AND COUNSELING • ELRC

GENERAL COURSES

5880 Special Topics in Education (1-3) V Prereq.: consent of instructor. May be taken for a max. of 9 hrs. of credit.

7299 Introduction to Scholarship in Education (3) Prereq.: consent of ELRC or ED students in the department, or permission of instructor. Introduction to scholarship in education and to demands and expectations of doctoral study.

7612 Foundations of Educational Development (3) Prereq.: consent of instructor. Development of students in the higher education environment, including theories and research related to intellectual, moral, ego, personal, and spiritual development.

7811 Seminar in Current Trends in Education (3) S Prereq.: consent of instructor. Students who have completed qualifying examination for the doctoral degree. Current issues and trends; sources, bibliographies, and the student's major.

7900 Independent Study (1-6) Prereq.: consent of instructor. May be taken for a max. of 12 sem. hrs. of credit. Open to advanced graduate students. Directed individual study under the guidance of a graduate faculty member.

8000 Thesis Research (1-12 per sem.) 7'U'U grading.

8900 Pre-dissertation Research (1-9) Prereq.: consent of department.

9000 Dissertation Research (1-12 per sem.) 7'U'U grading.

COUNSELOR EDUCATION

4360 Introduction to School Counseling (3) F Introduction to the design, implementation, management, and evaluation of comprehensive programs and assistance for the practitioner in solving special problems in school organization.

7299 Introduction to Scholarship in Education (3) Prereq.: consent of instructor. May be taken for a max. of 9 hrs. of credit.

7302 Group Dynamics and Techniques in the Elementary Schools (3-6) F Prereq.: consent of instructor; 2 hrs. conf.; 6-18 hrs. lab in school administration and attendance.

7362 Practicum in School Counseling (3-6) F, S Prereq.: ELRC 4360, 4565, 7330, 7331, 7395, and consent of instructor; 6-18 hrs. of work setting. Supervised clinical experience in elementary, middle, or high school settings.

7364 Community Agency Counseling Practicum (3-6) F, S, Su Prereq.: ELRC 4360, 7330, 7331, 7395, and consent of instructor. 2 hrs. conf.; 1 hr. lab; 6-18 hrs. lab in a work setting. Supervised clinical experience in community agency settings (e.g., counseling center, mental health center).

7365 Seminar in Counseling (3) Prereq.: ELRC 4360 and 7331, or equivalent. May be taken for a max. of 6 hrs. of credit when topic varies. Consultation with professor and peers regarding problems encountered in implementing counseling.

7390 Advanced Counseling Theory and Techniques (3) Su Prereq.: ELRC 7331 7390 or equivalent. Theoretical approaches to counseling.

7391 Counseling Across the Lifespan (3) Su Assessment of the comprehensive development of clients and design of developmentally appropriate counseling interventions.

7392 Advanced Social Work/Community Counseling (3) V Prereq.: ELRC 7334 or equivalent. Also offered as HRE 7392. Life career planning through vocational assessment and counseling; vocational counseling research, and practice.

7393 Multicultural Counseling (3) Su Overview of cross-cultural counseling skills and review of factors which influence the behaviors of individuals from diverse populations.

7394 Advanced Group Counseling (3) S Prereq.: ELRC 7334 7394 or equivalent. Theoretical and practical approaches to group counseling.

7395 Family Counseling (3) F, S Prereq. family system principles and their application to problem assessment, including family dynamics, family assessment, developmental stages, ethical and cultural issues.

7396 Advanced Family Counseling (3) S, Su Prereq.: ELRC 7395 or equivalent. Practice in assessing family dynamics, supervised experience in developing and implementing therapeutic interventions.

7397 Special Topics in Counseling (3) F, S, Su Prereq.: consent of instructor; 1 hr. lecture; 4 hrs. lab. May be taken for a max. of 6 hrs. of credit when topics vary.

7398 Field Experiences in Vocational Counseling (3) Prereq.: ELRC 7332 and 7334. 1 hr. lecture; 4 hrs. lab. May be taken for a max. of 6 hrs. of credit. Also offered as HRE 7398.

7399 Supervised Counseling Internship (3-9) F, S, Su Prereq.: ELRC 7350, 7352, or 7354 and consent of instructor. 2 hrs. conf.; 20-40 hrs. per week at a clinical setting, serving, children, adolescents, adults, or families. May be taken for a max. of 9 hrs. of credit.

EDUCATIONAL ADMINISTRATION

4400 Introduction to Educational Administration (3) F, S, Su Organization of the American educational enterprise; economic, political, social, and cultural forces that affect the administration of schools.

4700 Problems of Educational Finance (3) F, S, Su Financing public elementary and secondary schools in terms of federal, state, and local sources of revenue, tax structures, budget preparation, and cost analysis.

7401 Administration of School Personnel (3) S, Su Role of the school administrator in personnel planning, staff development, and employee relationships.

7402 Organizational Research in Educational Administration (3) Prereq.: ELRC 4400 and consent of instructor. Primarily for doctoral students in educational administration. Research, bibliography, and source materials; critical examination of current organizational research.

7403 The Principalship in Elementary and Secondary Schools (3) F, S, Su Prereq.: ELRC 4400 or equivalent. Duties and responsibilities of the principal for organization, administration, and supervision of elementary and secondary schools.

7404 Internship in Educational Administration (3-6) F, S, Su Prereq.: consent of instructor. May be taken for a max. of 6 sem. hrs. of credit. For advanced graduate students qualified for internship in educational administration. Open only.

7405 Supervision of Child Welfare and Attendance (3) Prereq.: ELRC 4400 and 7450, or equivalent. Role and function of the supervisor of child welfare and attendance; seminars, field study, and individual research; legal provisions, history, and philosophy.

7407 Politics of Human Administration in Education (3) Prereq.: ELRC 4400 and consent of instructor. Primarily for doctoral students in educational administration. Critical analysis of educational policy and its development.

7408 School and Community Relations (3) S Prereq.: ELRC 4400. Analysis of community demands on schools; organizational response from social science disciplines.

7409 Seminar in Educational Leadership (3) Prereq.: ELRC 4400. Exploration of theories of leadership, leading and empowering, cultural thinking, reflective practice, and school administration; school restructuring, leadership in unique contexts, and directions in educational change and development.

7410 Cultural and Political Issues in Urban School Leadership (3) Focus on the role of leaders, including the principal, in urban school settings, issues of societal factors, on urban school leaders in urban elementary and secondary schools.

7422 Introduction to School Improvement/Action Research (3) F School effectiveness research; teacher effectiveness research; school improvement; action research; based on the knowledge of these literatures, students will be required to develop a research proposal whose objective is to improve school and/or faculty performance.

7423 Advanced School Improvement/Action Research (3) S Prereq.: ELRC 7422. Students refine and administer an action research project at a selected school site. Students will assess the success of their interventions through multiple measurements and write an account of their experiences throughout the semester. In class discussions focusing on methodological difficulties that students encounter in action research.

7430 Best Practices of School Leadership I (6) Knowledge and experiential base to support decision making and action at a level of school responsibility.

7431 Best Practices of School Leadership II (6) F, S Prereq.: ELRC 7430. Second course in a two course sequence. Provides an experiential base to support decision making and action at a level of school responsibility.

7450 Supervision of Instruction in Elementary and Secondary Schools (3) F, S, Su Theories, principles, and practices concerning the role of the supervisor in today's multicultural school setting. Theories and practices concerning the role of the supervisor in today's multicultural school setting.

7451 Supervision of Student Teaching (3) F, S, Su Prereq.: principal of planning, observing, and evaluating student teaching; participation in student teaching; and teaching methods.

7602 Organization and Administration of Higher Education (3) S Organization and administration of postsecondary education in the United States and abroad; organizational theory; organization and governance structure of American higher education; patterns of institutional administration.

7800 Economics of Education (3) Prereq.: ELRC 7400 or equivalent. Introduction to human capital theory; emphasis on costs and benefits of education, benefit-cost analysis; educational productivity; education and economic growth; and educational planning.

7802 Theory Development in Educational Administration (3) Prereq.: ELRC 7006, 7402, and 7407, or equivalent; and consent of instructor. Primarily for doctoral students in educational administration. Critical analysis of approaches to inquiry; development of theory in educational administration.

7805 Perspectives on Leadership (3) F, S, Su Theories and practices of leadership from multiple perspectives.

7806 Leadership for Learning (3) Prereq.: ELRC 7405 or equivalent. Primarily for doctoral students in educational leadership and technology. Examination of leadership theories and practices relevant to K-12 school settings.


7890 Seminar: Educational Administration (1-3) Prereq.: master's degree. May be taken for a max. of 9 sem. hrs. of credit when topics vary. Advanced topics in educational administration.

EDUCATIONAL FOUNDATIONS

3600 Women, Gender, and Leadership (3) Also offered as WGS 3600.


4002 Survey of Philosophy of Education (3) F, S Prereq.: Key concepts and theories of human nature, culture, and society and their bearings on education.
4003 Cultural Pluralism in American Education (3) Basic features of major cultures in American society; their impact on American education; historical approaches to educating persons of different cultures; changing roles of schools in responding to cultural pluralism.

7000 Seminar in Educational Research (3) Su Prereq.: ELRC 4002. Theories of education and schooling with special focus on the context of pluralistic societies.

7001 Ethics and Education Leadership (3) Su Study of ethical theory, judgement, and practice in education.

EDUCATIONAL RESEARCH

3200 Classroom Assessment (3) F,S,Su Prereq.: credit or registration in methods course appropriate to the student's teaching level or major or minor. Principles and techniques in development, administration, scoring, and evaluation of written, performance-based, and other forms of classroom assessment; applications of technology in classroom assessment.

4006 Introduction to Applied Statistics in Educational Research (3) F,S,Su Basic descriptive and inferential statistics in educational research; systematic examination and interpretation of statistical information in published educational research.

4200 Introduction to Educational Measurement (3) F,S,Su Basic principles of educational measurement; assessment in the school setting; test construction and use; evaluation and applications of standardized tests; measurement in educational research.

4249 Understanding and Applying Research in Education (3) F,S,Su For the specialist or nonthesis master’s degree student. Introducing test-taking to administrators to become intelligent consumers of research.

6006 Educational Statistics (4) F Prereq.: ELRC 4006 or equivalent. Lab. Description of descriptive and inferential statistics in educational research, computerized data analysis using SPSS or SAS; correlation and regression; normal, t, chi-square, and F distributions; hypothesis testing and interval estimation; analysis of variance, nonparametric chi-square test.

4100 Principles of Testing and Measurement (3) Prereq.: ELRC 7006. Construction of measurement instruments for research purposes; utilization of standardized tests and inventories in the teacher's role in multicultural and cross-cultural contexts; implications of measurement reliability and validity for research design and statistical analysis.

6016 Advanced Educational Statistics (4) Prereq.: ELRC 7006 or equivalent. 3 hrs. lecture; 2 hrs. lab. Advanced statistical procedures and computerized data analysis using SPSS or SAS; analysis of variance and covariance; application of multiple regression techniques in educational research.

7020 Intermediate Computer Science (3) Prereq.: ELRC 6200. Principles of psychological theory as applied in the educational setting; classical measurement theory and recent psychometric techniques such as item-response theory and criterion-referenced measurement.

7022 Seminar in Educational Measurement (3) Su Prereq.: ELRC 7006 and 7201. Basic theories and problems in educational measurement.

7022 Computer Assisted Testing (3) Prereq.: ELRC 7006. Computer adaptive testing; computerized item and test development; continuous and intelligent measurement; analyzing and reporting test results; legal issues and professional standards.

7220 Education Program Evaluation (3) F Prereq.: ELRC 4249 and either ELRC 4006 or 7006. Current models and issues in educational evaluation as a practical profession; design of a comprehensive evaluation plan that includes specification of theoretical framework, problem identification, data collection/analysis procedures, report writing format, and dissemination plans; analyzing and reporting test results; legal issues and professional standards.

7221 Performance Evaluation in Education (3) S Prereq.: ELRC 4200 and 4249; or equivalent. Current procedures and research concerning performance evaluation in the United States and abroad; analysis of professional, administrative, and instructional performance evaluations; evaluation of instruction, teachers, and administrators; methodological, professional, and legal issues.

7241 Educational Research Methodology (3) F,S Prereq.: ELRC 4006 or 7006. Completion of a research proposal, preferably a pre-dissertation proposal, is required. Comprehensive study of the principles of qualitative and quantitative research methods in education.

7242 Experimental and Quasi-Experimental Designs in Educational Research (3) F,S Prereq.: ELRC 7016 and 7241. Principles and procedures for designing educational research; evaluation of internal/external validity; design and implementation of research experiments; statistical analysis of research data through computer programs; advanced analysis of variance and covariances; multiple regression.

7243 Qualitative Educational Research (4) S Prereq.: ELRC 4249 or 7241. 3 hrs. lecture; 2 hrs. lab. Introduction to qualitative research traditions and methods in education, including paradigmatic grounding; theory; case study; major methods including observational techniques, interviewing, and document analysis; philosophical issues in the research approach; emphasis on qualitative data analysis, including the use of computer programs, such as ATLAS.ti.

7248 Introductory Research Practicum (3) F By arrangement with a state agency, a local school system, or other educational agency, students assist in the conducting of a variety of research methodologies under the supervision of the course instructor and the professional practice supervisor at the site.

7249 Advanced Research Practicum (3) Prereq.: ELRC 7248. By arrangement with a state agency, a local school system, or other educational agency, students assume a leadership role in conducting research studies under the supervision of a professional practice supervisor at the site.

7251 Technology Systems in Educational Research (3) S Prereq.: ELRC 7006. 2 hrs. lab. Technology innovations and models that facilitate educational research; telecommunications and technology systems as instructional tools; technology-based data collection devices; computer analysis of test-based data; computer-aided dissemination of data.

7260 Introduction to SPSS Program Evaluation (3) Prereq.: ELRC 7270. Evaluation of a selected educational program; establishing program parameters; formative/summative evaluations; guides for conducting evaluations and small experiments; report writing.

7263 Advanced Qualitative Methods in Education (3) Prereq.: ELRC 7241. Construction of a case study of an educational institution or an individual’s life; single- and multiple-case designs; analyzing case study evidence; report writing.

7270 Mixed Methods Research in Education (3) Prereq.: ELRC 7241. Construction of a case study of an educational institution or an individual’s life; single- and multiple-case designs; analyzing case study evidence; report writing.

7290 Seminar: Educational Research Methodology (1-3) May be taken for a max. of 9 sem. hrs. of credit when topics vary. Advanced topics in educational research methods.

EDUCATIONAL TECHNOLOGY

2507 Introduction to Classroom Technology (3) Introduction to technology tools and effective technology integration methods to enhance student learning.

2508 SE Technology Practicum: Open only to candidates for teacher certification. Basic techniques for preparing effective instructional materials. 4501 Selection and Utilization of Educational Media (3) Introduction to instructional technology; characteristics of media, objective specifications, and evaluation of instructional media and systems.

4507 Computer Technology in Education (3) Applications of computers in instruction; educational data processing, computer-assisted and computer-managed instruction; information storage and retrieval, use of micro/multi-computers.

4512 Fundamental Computer Science for Teachers (3) Prereq.: ELRC 4507 (or prior programming experience) and credit in an educational methods course numbered 3000 or above. CSC 4660

4535 Educational Telecommunications and the Internet (3) Prereq.: ELRC 4507 or equivalent. 2 hrs. lecture; 2 hrs. lab. Use of telecommunication tools found in educational settings; integration of telecommunications resources into instruction; research using the World Wide Web; design, development, and evaluation of Web-based materials that include multimedia, interactive, and experimental educational sequences for the Internet.

7240 Seminar: Research in Educational Media (3) Su Prereq.: ELRC 4501, 4507, or equivalent. Analysis of current literature in the field; evaluation of current and needed research; systems approach to solving practical problems.

7240 Administration of Technology Programs (3) S Prereq.: ELRC 4501 or 4507 or consent of instructor. Procedures for personnel and program management, planning, implementing, and evaluating educational technology programs. Topics include applications, facilities, finances, accreditation, and staff development.

7500 Technology in Educational Leadership (3) F,S,Su Overview of salient advances in theory, research, and practice in educational technology; examining the content of leadership roles in regard to emerging trends and issues in educational technology; analyzing current technology integration strategies.

7502 Principles of Distance Education (3) F,S,Su Prereq.: ELRC 4507 or consent of instructor. Applications of the principles of distance education to teaching and learning in educational and training contexts.

7503 Instructional Design (3) F Prereq.: ELRC 4507 or approved equivalent. Instructional design theories and models and their application in solving real world instructional/learning problems.

7504 Educational Technology and the Law (3) Legal issues concerning educational technology.

7505 Design and Development of Multimedia Instructional Units (3) Prereq.: ELRC 4507 and 7503; or equivalent. Instructional design for computer-assisted instruction; emphasis on learning theory, events of instruction, structural instructional sequences for maximum content retention.

7509 Authoring Systems for Educators (3) Prereq.: ELRC 4507 and 7503, or equivalent. 2 hrs. lecture; 2 hrs. lab. Authoring systems, with emphasis on SCORM and LOGO for individualized learning; system variables, transfer and portability parameters, student instruction, alternative instructional methods, and formative and summative evaluation procedures.

7516 Practicum in Educational Media (3-6) F,S,Su Prereq.: ELRC 7240 or 7503; or consent of instructor. 9-18 hrs. lab. Practical experience in teaching, producing, utilizing, and administering educational media.

7517 Seminar in Educational Media (3) Prereq.: ELRC 7240 and 7420; or consent of instructor. Advanced topics in instructional technology.

7525 Educational Technology in Business, Industry, and Government Agencies (3) Prereq.: ELRC 7503 and one of the following: ELRC 5505, 7502. Techniques used to meet training and development needs in business, industry, and governmental agencies.

7525 Professional Development for K-12: Technology Integration (3) F Analyze effective professional development strategies; plan, design and implement, and evaluate technology staff development activities.

7535 Advanced Telecommunications and Electronic Learning (3) F,S,Su Prereq.: ELRC 4507 or consent of instructor. Scope and elements of the online environment; technologies and strategies for online learning; design, development, or conversion of courses for online delivery; course management, assessment, and evaluation policies issues.

7550 Theory and Research in Educational Technology (3) Prereq.: ELRC 7240 and 7503. For advanced graduate students. Theoretical foundations and research in educational technology; emphasis on theories of communication, learning theories, educational psychology, and behavioral sciences.

7791 Educational System Analysis (3) V Prereq.: completion of 3 sem. hrs. in educational administration or equivalent. Basic techniques for designing instructional systems; emphasis on instructional objectives; design and selection of instructional alternatives; and evaluation of instructional systems.

HIGHER EDUCATION

4364 Student Affairs in Higher Education (3) V Basic concepts and issues in the college student affairs field.

7600 Issues of Race and Gender in Higher Education (3) Historical and sociopolitical foundations of higher education experiences of women, African-Americans, Asian-Americans, and Hispanics, focusing primarily on the period from the 1960s to the present. Understanding and valuing the multiple perspectives that students bring to the campus.

7601 Foundations of Higher Education (3) History of the sociological and philosophical foundations for higher education in the United States.

7603 Leadership in Higher Education (3) S Analysis of leadership issues and theory relating to postsecondary education; exploring the roles of the president of a college or university.

7604 Politics of Higher Education (3) Sociopolitical and governmental influences on higher education; public policy issues.

7605 Higher Education and the Law (3) Course examines the legal issues surrounding higher education; issues
of race and gender, politics, and policy of student loans; policies toward unprepared college students; collective bargaining processes.

7605 Higher Education and the Law (3) Legal issues concerning higher education, including tenure, academic freedom, sexual harassment, laws against discrimination, student discipline, and liability for accidents and injuries.

7606 Research in College and College Teaching (3) Critical analysis of college curricula and approaches to teaching; historical development of curricular models; introduction to teaching innovation practices.

7607 Finance in Higher Education (3) Public policy and theory of financing higher education; topics include tuition, pricing, public policy, financial management of institutions, and financial aid.

7609 Strategic Planning in Higher Education (3) Strategic plans for institutions of higher education; processes by which those plans are developed; higher education strategy within the context of the cultural and competitive environment; emphasis on current issues in organizational strategy.

7610 Assessment and Evaluation in Higher Education (3) Analysis of assessment and evaluation practices in higher education; role of assessment in policy development and strategic planning.

7611 College Students in the United States (3) Critical analysis of issues related to college students in the United States, including access, choice, student organization, and development and identity.

ELECTRICAL ENGINEERING • EE

2120 Circuits I (3) Prereq.: consent of Math in MATH 2090 and PHY 2102 required or consent of department. Time-domain analysis of electrical networks.

2130 Circuits II (3) Prereq.: EE 2120 and MATH 2090. Frequency-domain analysis of electrical networks.

2230 Electronics I (3) Prereq.: EE 2120. Terminal behavior of semiconductor devices and basic circuits.

2231 Electronics Laboratory I (2) Prereq.: concurrent registration in EE 2230. Lecture, 2 hrs.; lab, 2 hrs.; terminal behavior of semiconductor devices.

2720 Digital Logic I (2) Prereq.: admission to the College of Engineering. Boolean algebra; logic gates; minimization methods; analysis and synthesis of combinational logic networks; design examples.

2730 Digital Logic II (2) Prereq.: EE 2720. Analysis and design of sequential circuits; practical impact of design choices.

2731 Digital Logic Design (2) Prereq.: EE 2730. 1 hr. lecture, 2 hrs. lab. Familiarization with conventional logic gates and flip-flops; design and testing of various combinational and sequential circuits.

2950 Comprehensive Electrical Engineering (3) Prereq.: MATH 1552 or equivalent. For nonengineering science majors. Elementary circuits, devices, and systems in electrical engineering.

3060, 3061 Special Projects (2, 3) Prereq.: consent of department. Pass-fail grading. Individual work with instructor on research topic selected by instructor and student.

3070 Engineering Practice (3) Prereq.: permission of department and either completion of one co-op session or six months of full-time employment in an appropriate field. Pass-fail grading. Written final report required. Work experience in solving electrical and computer engineering problems in industrial environment.

3140 Probability for Electrical and Computer Engineering (3) Prereq.: MATH 2090. Basic concepts of probability theory with application to electrical and computer engineering; probability axioms; continuous, discrete, and conditional probability density and distribution functions; expectations and characteristics functions; introduction to statistical inference and stochastic processes.

3160 Introduction to Digital Signal Processing (3) Prereq.: EE 3060 or equivalent. Digital processing of continuous-time signals, discrete-time signals, and systems in the transform domains; digital filter design techniques; Discrete Fourier transform and FFT algorithm.

3220 Electronic Devices I (3) Prereq.: EE 2120, 3230, and 3231. Analysis and design of electronic circuits; emphasis on concepts and device models.

3221 Electronics Laboratory II (2) Prereq.: EE 2231 and concurrent registration in EE 3220. 1 hr. lecture, 2 hrs. lab.


3320 Electrical and Magnetic Fields (3) Prereq.: MATH 2057. Static and dynamic electric fields; wave propagation and reflection in isotropic media; static fields.

3410 Electric Power (3) Prereq.: EE 2130. Basic principles of electromechanical energy conversion and power system operation.

3571 Microwave Microscopy (3) Prereq.: CSC 1251 and EE 2730. Theory and design of microprocessors; semiconductor technologies, architectures, assembly language, software development, input/output design, applications, and interfacing.

3622 Optical Instrumentation and Metrology (3) Prereq.: EE 3220 or equivalent. 2 hrs. lecture; 2 hrs. lab. Measurement and analysis of laser output parameters and specific laser systems; modulation and detection of optical radiation; fiber optic applications.

3636 Emerging Applications in Nanoscale Systems (3) Prereq.: EE 3410 or equivalent. 3 hrs. lecture. Waveguides, cavities, signal sources, and other microwave devices.

3730 Antenna Theory and Design (3) Prereq.: EE 3530 or equivalent. 3 hrs. lecture. 3 hrs. lab. Antennas and antenna arrays; measurement of impedances and far-zone radiation patterns.

3740 Fiber Optic and Microwave Propagation (3) Prereq.: EE 3530 and 3320 or equivalent. Wave propagation in fiber and waveguides, and characteristics and applications of optical fibers.

4110 Power System Protection (3) Prereq.: EE 3410 or equivalent. Broad based introduction to utility and industrial power system protection. Topics of study include transmission, distribution, generation, and industrial distribution systems.

4122 Electric Machine Design (3) Prereq.: EE 3410 or equivalent. 2 hrs. lecture, 2 hrs. lab. ABET category: 2 hrs. design, 1 hr. engineering science. Design and performance analysis of electric machines in steady-state and dynamic conditions using a simulation on PC and lab experiments.

4123 Power System Analysis (3) Prereq.: EE 3410 or equivalent. Power system analysis and computer methods of load flow, economic dispatch, and power system stability.

4141 Control System Design and Control (3) Prereq.: EE 3410 or equivalent. 1 hr. design, 1 hr. engineering science. Control of major utility interconnected power system. Control of generation and operation of interconnected systems, stability, and transmission and distribution systems, and large industrial power systems.

4150 Distribution System Design (3) Prereq.: EE 3410 or equivalent. 3 hrs. lecture, 2 hrs. lab. ABET category: 2 hrs. design, 1 hr. engineering science. Power distribution systems; emphasis on design and applications.

4160 Power Electronics (3) Prereq.: EE 3230 and 3410. 2 hrs. lecture, 2 hrs. lab. ABET category: 2 hrs. design, 1 hr. engineering science. Design of power converters and harmonics filters for distribution systems with non sinusoidal voltages and currents.

4168 Nonlinear Power System Analysis (3) Prereq.: EE 3610 or equivalent. Analysis of nonlinear systems, harmonic generation, compensation, and filtering.

4171 Adjustable Speed Drives (3) Prereq.: EE 3410. EE 3530, 2 hrs. lecture, 2 hrs. lab. ABET category: 2 hrs. design, 1 hr. engineering science. Design and test of DC and AC motor variable speed drives combined with analog and digital control.

4560 Introduction to Modern Control (3) Prereq.: EE 3530. State variable methods for analysis and design of linear systems; robust control, stability, and stabilization; observers, control design.

4580 Topics in Control System Design (3) Prereq.: EE 3530 and 3410. 2 hrs. lecture, 2 hrs. lab. ABET category: 2 hrs. design, 1 hr. engineering science. Compensation of single loop and multiloop systems; state estimation; stability; application to industrial controllers; design using computer simulation packages.

4585 Discrete Control System Design (3) Prereq.: EE 3530. 2 hrs. lecture, 2 hrs. lab. ABET category: 2 hrs. design, 1 hr. engineering science. Sampling and reconstruction of signals; analysis and design of sampled data systems; discrete time systems and controllers.

4588 Analog Communication (3) Prereq.: EE 3610 and 3140. Amplitude, frequency, phase and pulse modulation, noise in analog modulation applications.

4592 Digital Communication and Networking (3) Prereq.: EE 3410 or equivalent. Probability spaces; random variables and processes; second order processes; spectral analysis; filtering.

4700 Special Topics in Electrical Engineering (3) Prereq.: EE 3410 or equivalent. May be taken for a max. of 6 hrs. of credit when topics vary. Students in curricula other than computer engineering should consult the instructor. ABET category: 3 hrs. engineering science. Selected topics of current interest.

4701 Special Topics in Computer Engineering (3) Prereq.: EE 3410 or equivalent. May be taken for a max. of 6 hrs. of credit when topics vary. Students in curricula other than computer engineering should consult the instructor. ABET category: 1 hr. design; 1 hr. engineering science. Selected topics of current interest.