Electrical Engineering: Circuits and Systems

**ECT 5321** Introduction to Circuits and Systems (3 semester credit hours) Continuation of EEMF 5320. Topics include analog circuits, digital circuits, digital systems and communication systems. May not be used to fulfill 33 semester credit hours in MSEE degree requirements. (3-0) R

**ECT 5340** Analog Integrated Circuit Analysis and Design (3 semester credit hours) Application of MOSFET and BJT large-signal and small-signal models to analyze and design amplifiers, analysis and design of current mirrors and differential amplifiers, analysis of frequency response of amplifiers, and feedback theories. Prerequisite: EE 3311 or equivalent. (3-0) Y

**ECT 6325** (CE 6325) VLSI Design (3 semester credit hours) Introduction to MOS transistors. Analysis of the CMOS inverter. Combinational and sequential design techniques in VLSI; issues in static, transmission gate and dynamic logic design. Design and layout of complex gates, latches and flip-flops, arithmetic circuits, memory structures. Low power digital design. The method of logical effort. CMOS technology. Use of CAD tools to design, layout, check, extract and simulate a small project. Prerequisites: EE 3301 and EE 3320 or equivalent. (3-0) S

**ECT 6326** Analog Integrated Circuit Design (3 semester credit hours) Further treatment on the use of MOSFET and BJT large signal and small signal models to analyze and design analog integrated circuits. Topics include advanced current mirrors, references, frequency response of single-stage and differential amplifiers, stability and compensation of amplifiers, design of two-stage amplifiers, common mode feedback, and introduction of noise analysis. Use of CAD tools to simulate and design analog integrated circuits. Prerequisite: EE 4340. (3-0) S

**ECT 6378** Power Management Circuits (3 semester credit hours) This course introduces different circuits related to power management systems. Topics include analysis and design of voltage references, magnetics, and different dc-dc converters including: switched-mode power converters, linear regulators and switched-capacitor charge pumps. Use of CAD tools to design and simulate power management circuits. Prerequisite: EECT 6326 or equivalent. (3-0) Y

**ECT 6379** Energy Harvesting, Storage and Powering for Microsystems (3 semester credit hours) This course studies the electrical characteristics of various renewable energy sources and the corresponding approaches on harvesting and storage, with emphasis on the imposed requirements of microscale dimension. They are followed by the discussion on power conditioning and cross-layer energy/power management with circuit implementations. Prerequisite: EE 3311 or equivalent. (3-0) Y

**ECT 7325** (CE 7325) Advanced VLSI Design (3 semester credit hours) Advanced topics in VLSI design covering topics beyond the first course (ECT 6325). Topics include: use of high-level design, synthesis, and simulation tools, clock distribution and routing problems, (a)synchronous circuits, low-power design techniques, study of various VLSI-based computations, systolic arrays, etc. Discussions on current research topics in VLSI design. Prerequisite: EECT 6325 or equivalent. (3-0) Y

**ECT 7326** Advanced Analog Integrated Circuit Design (3 semester credit hours) Advanced topics in analog design including a rigorous treatment of noise, feedback and distortion in analog circuits. Selected topics from other advanced topics such as continuous-time filter, oscillator, phase-locked loop (PLL) and delay-locked loop (DLL) are also covered. Prerequisite: EECT 6326. (3-0) T
**EECT 7327** Data Converters (3 semester credit hours) Data converter circuits in modern mixed-signal VLSI systems. Topics include sampling, switched-capacitor amplifiers and integrators, sample-and-hold circuits, voltage comparators, Nyquist-rate and oversampling converters. Prerequisites: **EECT 6325** and **EECT 6326**. (3-0) T

**EECT 7V88** Special Topics in Circuits and Systems (1-6 semester credit hours) May be repeated for credit as topics vary (9 semester credit hours maximum). ([1-6]-0) R