

# Course Schedule - Spring 2008

## Electrical and Computer Engineering

101 **Exploring Digital Info Technol** credit: 3 hours.

Principles and processes for the development of information technologies: digital music, digital images, digital logic, data compression, error correction, information security, and communication networks. Laboratory for design of hardware and software, and experiments in audio and image processing. Intended for students outside the College of Engineering. Credit is not given to Computer or Electrical Engineering majors.

This course satisfies the General Education Criteria for a Physical Sciences course.

CRN	Type	Section	Time	Days	Location	Instructor
39883	laboratory	ABA	08:00 AM - 09:50 AM	F	room 268 Everitt Elec and Comp Engr Lab	Schmitz, C; Quek, D
39883: Physical Sciences course.						
39895	laboratory	ABB	10:00 AM - 11:50 AM	F	room 268 Everitt Elec and Comp Engr Lab	Gahvari, Z; Schmitz, C
39895: Physical Sciences course.						
39896	laboratory	ABC	01:00 PM - 02:50 PM	F	room 268 Everitt Elec and Comp Engr Lab	Schmitz, C; Quek, D
39896: Physical Sciences course.						
44839	laboratory	ABH	03:00 PM - 04:50 PM	F	room 268 Everitt Elec and Comp Engr Lab	Gahvari, Z; Schmitz, C
44839: Physical Sciences course.						
39374	lecture	AL	11:00 AM - 11:50 AM	TR	room 335 Mechanical Engineering Bldg	Schmitz, C
39374: Physical Sciences course.						

110 **Intro Elec & Computer Engrg** credit: 4 hours.

Integrated introduction to selected fundamental concepts and principles in electrical and computer engineering: circuits, electromagnetics, communications, electronics, controls, and computing. Laboratory experiments and lectures focus on a design and construction project, such as an autonomous moving vehicle. Prerequisite: Credit or concurrent registration in MATH 220 or MATH 221.

Students must register for one lab and one lecture section beginning with the same letter.

CRN	Type	Section	Time	Days	Location	Instructor
32456	laboratory	ABA	09:00 AM - 11:50	M	room 146 Everitt	Franke, P; Adekunle,

			AM		Elec and Comp Engr Lab	O; Khan, A
32459	laboratory	ABB	08:00 AM - 10:50 AM	T	room 146 Everitt Elec and Comp Engr Lab	Franke, P; Wagner, A; Matthews, D
32460	laboratory	ABC	11:30 AM - 02:20 PM	T	room 146 Everitt Elec and Comp Engr Lab	Franke, P; Lawson, M
32461	laboratory	ABD	09:00 AM - 11:50 AM	W	room 146 Everitt Elec and Comp Engr Lab	Franke, P; Adekunle, O
32462	laboratory	ABE	11:30 AM - 02:20 PM	R	room 146 Everitt Elec and Comp Engr Lab	Franke, P
32463	laboratory	ABF	09:00 AM - 11:50 AM	F	room 146 Everitt Elec and Comp Engr Lab	Franke, P; Quek, D; Pan, L
32464	lecture	AL1	01:00 PM - 01:50 PM	MWF	room 151 Everitt Elec and Comp Engr Lab	Brunet, M
32465	laboratory	BBA	02:00 PM - 04:50 PM	M	room 146 Everitt Elec and Comp Engr Lab	Franke, P; Pepich, M; Eisenhower, W; Kong, C
32466	laboratory	BBB	03:00 PM - 05:50 PM	T	room 146 Everitt Elec and Comp Engr Lab	Franke, P; Goh, P; Pepich, M
32467	laboratory	BBC	02:00 PM - 04:50 PM	W	room 146 Everitt Elec and Comp Engr Lab	Franke, P; Eisenhower, W; Kong, C
32468	laboratory	BBD	08:00 AM - 10:50 AM	R	room 146 Everitt Elec and Comp Engr Lab	Franke, P; Abu-Romeh, A
32469	laboratory	BBE	03:00 PM - 05:50 PM	R	room 146 Everitt Elec and Comp Engr Lab	Franke, P; Mahmoud, S; Pan, L
32470	laboratory	BBF	02:00 PM - 04:50 PM	F	room 146 Everitt Elec and Comp Engr Lab	Franke, P; Goh, P; Benmlih, F
32471	lecture	BL1	12:00 PM - 12:50 PM	MWF	room 151 Everitt Elec and Comp Engr Lab	Haken, L

190 **Intro to Computing Systems** credit: 4 hours.

Bits, binary representations, digital logic structures, the von Neumann computing model, an example instruction set, machine and assembly language programming, machine-level input/output, subroutines, the C programming language, variables and operators, control constructs, functions in C, pointers and arrays, input/output in C,

recursion, and simple data structures. Credit is not given for both ECE 190 and CS 125.

CRN	Type	Section	Time	Days	Location	Instructor
39001	discussion-recitation	AD1	03:00 PM - 03:50 PM	F	room 170 Everitt Elec and Comp Engr Lab	Patel, S
39002	discussion-recitation	AD2	03:00 PM - 03:50 PM	F	room 163 Everitt Elec and Comp Engr Lab	Patel, S
38999	discussion-recitation	AD3	01:00 PM - 01:50 PM	F	room 169 Everitt Elec and Comp Engr Lab	Patel, S
39000	discussion-recitation	AD4	09:00 AM - 09:50 AM	F	room 169 Everitt Elec and Comp Engr Lab	Patel, S
39003	discussion-recitation	AD5	12:00 PM - 12:50 PM	F	room 163 Everitt Elec and Comp Engr Lab	Patel, S
47720	discussion-recitation	AD6	09:00 AM - 09:50 AM	F	room 163 Everitt Elec and Comp Engr Lab	Patel, S
47721	discussion-recitation	AD7	01:00 PM - 01:50 PM	F	room 163 Everitt Elec and Comp Engr Lab	Patel, S
43754	lecture-discussion	AE1	02:30 PM - 03:50 PM	TR	room 151 Everitt Elec and Comp Engr Lab	Hutchinson, S; Patel, S

200 **Seminar** credit: 0 hours.

Discussions of educational programs, career opportunities, and other topics in electrical and computer engineering. Approved for S/U grading only. For Computer Engineering and Electrical Engineering majors only.

CRN	Type	Section	Time	Days	Location	Instructor
32482	lecture	SH	05:00 PM - 06:50 PM	W	room 151 Everitt Elec and Comp Engr Lab	Kudeki, E
32482: This course does not meet the first two weeks of the semester.						

205 **Elec & Electronic Circuits** credit: 3 hours.

Basic principles of circuit analysis, transient analysis, AC steady-state analysis, introduction to semiconductor devices and fabrication, digital logic circuits, op-amps, and A/D and D/A conversion. Credit is not given to Computer or Electrical Engineering majors. Prerequisite: PHYS 212.

CRN	Type	Section	Time	Days	Location	Instructor
32483	lecture	A	09:00 AM - 10:20 AM	TR	room 151 Everitt Elec and Comp Engr Lab	Zhang, J
32483: 3 hours						
32484	lecture	F	02:00 PM - 03:20 PM	TR	room 1310 Digital Computer Laboratory	Choi, H
32484: 3 hours						

206 **Elec & Electronic Circuits Lab** credit: 1 hours.

Laboratory instruments and basic measurement techniques, electric circuits, CMOS logic circuits, DTL and TTL circuits, and op-amps. Credit is not given to Computer or Electrical Engineering majors. Prerequisite: PHYS 212; concurrent registration in ECE 205.

CRN	Type	Section	Time	Days	Location	Instructor
32485	laboratory	F1	10:00 AM - 11:50 AM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Lobdell, B
32485: 1 hours						
32501	laboratory	F10	06:00 PM - 07:50 PM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Lu, M
32501: 1 hours						
32486	laboratory	F11	08:00 AM - 09:50 AM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Bunge, B
32486: 1 hours						
32487	laboratory	F2	12:00 PM - 01:50 PM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Davoudi, A
32487: 1 hours						
32489	laboratory	F3	08:00 AM - 09:50 AM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Lee, M
32489: 1 hours						
32491	laboratory	F4	02:00 PM - 03:50 PM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Davoudi, A
32491: 1 hours						

32493	laboratory	F5	10:00 AM - 11:50 AM	W	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Bunge, B
32493: 1 hours						
32495	laboratory	F6	01:00 PM - 02:50 PM	W	room 268 Everitt Elec and Comp Engr Lab	Liu, J; Zhang, J
32495: 1 hours						
32497	laboratory	F7	06:00 PM - 07:50 PM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Lee, B
32497: 1 hours						
32499	laboratory	F8	06:00 PM - 07:50 PM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Qian, Z
32499: 1 hours						
32502	laboratory	F9	06:00 PM - 07:50 PM	W	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Lovitt, A
32502: 1 hours						

210 **Analog Signal Processing** credit: 4 hours.

Introduction to analog signal processing, with an emphasis on underlying concepts from circuit and system analysis: linear systems, review of elementary circuit analysis, differential equation models of linear circuits and systems, Laplace transform, convolution, stability, phasors, frequency response, Fourier series, Fourier transform, active filters, and AM radio. Credit is not given for both ECE 210 and ECE 211. Prerequisite: ECE 110 and PHYS 212; credit or concurrent registration in MATH 285 or MATH 286.

Students must register for one lab and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
32534	laboratory	ABA	10:00 AM - 11:50 AM	M	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32535	laboratory	ABB	10:00 AM - 11:50 AM	M	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32536	laboratory	ABC	12:00 PM - 01:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32537	laboratory	ABD	12:00 PM - 01:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32538	laboratory	ABE	02:00 PM - 03:50	M	room 234 Everitt	Reddy, U; Benavi, A;

			PM		Elec and Comp Engr Lab	Reyes, P; Blackburn, J
32539	laboratory	ABF	02:00 PM - 03:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32541	laboratory	ABG	04:00 PM - 05:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32561	laboratory	ABH	04:00 PM - 05:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32564	laboratory	ABI	06:00 PM - 07:50 PM	T	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32566	laboratory	ABJ	06:00 PM - 07:50 PM	T	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32571	laboratory	ABK	06:00 PM - 07:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32575	laboratory	ABL	06:00 PM - 07:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Reddy, U; Benavi, A; Reyes, P; Blackburn, J
32505	lecture	AL1	09:00 AM - 09:50 AM	MTWF	room 165 Everitt Elec and Comp Engr Lab	Trick, T
32532	lecture	AL2	01:00 PM - 01:50 PM	MTWF	room 269 Everitt Elec and Comp Engr Lab	Hasegawa-Johnson, M
32533	lecture	AL3	02:00 PM - 02:50 PM	MTWF	room 269 Everitt Elec and Comp Engr Lab	Basar, T

211 **Analog Circuits & Systems** credit: 2 hours.

Introduction to concepts from circuit and system analysis: linear systems, review of elementary circuit analysis, op amps, transient analysis, differential equation models of linear circuits and systems, and Laplace transform. Credit is not given for both ECE 211 and ECE 210. Prerequisite: ECE 110 and PHYS 212; credit or concurrent registration in MATH 285 or MATH 286.

CRN	Type	Section	Time	Days	Location	Instructor
32581	lecture	B	09:00 AM - 09:50 AM	MTWF	room 165 Everitt Elec and Comp Engr Lab	Trick, T
32581: Meets 14-Jan-08 - 07-Mar-08.						

32581: 2 hours						
32620	lecture	E	01:00 PM - 01:50 PM	MTWTF	room 269 Everitt Elec and Comp Engr Lab	Hasegawa-Johnson, M
32620: Meets 14-Jan-08 - 07-Mar-08.						
32620: 2 hours						
32660	lecture	F	02:00 PM - 02:50 PM	MTWTF	room 269 Everitt Elec and Comp Engr Lab	Basar, T
32660: Meets 14-Jan-08 - 07-Mar-08.						
32660: 2 hours						

280 **Biomedical Imaging** credit: 3 hours.

Introduction to the physics and engineering principles associated with magnetic resonance, ultrasound, computed tomography, and nuclear imaging. Same as BIOE 280. Prerequisite: MATH 285 or MATH 286.

CRN	Type	Section	Time	Days	Location	Instructor
39320	lecture	G	09:00 AM - 10:20 AM	TR	room 106B8 Engineering Hall	Popescu, G
39320: 3 hours						

290 **Computer Engineering I** credit: 3 hours.

Introduction to digital logic and computer systems. Representation of information, combinational network analysis and design, sequential network analysis and design, computer organization and control. Laboratory for design and simulation of digital systems. Credit is not given for both ECE 290 and CS 231. Prerequisite: One of CS 101, CS 125, ECE 110, ECE 190.

Students must register for one discussion and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
32786	discussion-recitation	ADB	09:00 AM - 09:50 AM	R	room 169 Everitt Elec and Comp Engr Lab	Brown, D; Holm, J
32787	discussion-recitation	ADC	10:00 AM - 10:50 AM	R	room 170 Everitt Elec and Comp Engr Lab	Brown, D; Liu, Y
32788	discussion-recitation	ADD	11:00 AM - 11:50 AM	R	room 169 Everitt Elec and Comp Engr Lab	Brown, D; Baker, D
32789	discussion-recitation	ADE	12:00 PM - 12:50 PM	R	room 169 Everitt Elec and Comp Engr Lab	Brown, D; Baker, D

32790	discussion-recitation	ADF	01:00 PM - 01:50 PM	R	room 169 Everitt Elec and Comp Engr Lab	Brown, D; Sloan, J
32791	discussion-recitation	ADG	02:00 PM - 02:50 PM	R	room 169 Everitt Elec and Comp Engr Lab	Brown, D; Sloan, J
32792	discussion-recitation	ADH	03:00 PM - 03:50 PM	R	room 169 Everitt Elec and Comp Engr Lab	Brown, D; Baillio, B
32793	lecture	AL1	12:00 PM - 12:50 PM	MW	room 112 Gregory Hall	Brown, D

**307 *Techniques for Engrg Decisions*** credit: 3 hours.

The course is concerned with the modeling of decisions in engineering work and the analysis of models to develop a systematic approach to making decisions. The course aims to teach students to think structurally about decision-making problems. Fundamental concepts in linear and dynamic programming, probability theory, and statistics serve as the mathematical basis for the development of techniques for solving typical problems faced in making engineering decisions in industry and government. Topics include resource allocation, logistics, scheduling, sequential decision making, siting of facilities, investment decisions, application of financial derivatives, and other problems for decision making under uncertainty. Extensive use of case studies from actual industrial applications gets students involved in real-world decisions. Prerequisite: ECE 210; credit or concurrent registration in ECE 313.

CRN	Type	Section	Time	Days	Location	Instructor
39322	lecture	G	11:30 AM - 12:50 PM	TR	room 245 Everitt Elec and Comp Engr Lab	Gross, G
39322: 3 hours						

**313 *Probability with Engrg Applic*** credit: 3 hours.

Introduction to probability theory with applications to engineering problems such as the reliability of circuits and systems; and to statistical methods for hypothesis testing, decision making under uncertainty, and parameter estimation. Prerequisite: ECE 210.

CRN	Type	Section	Time	Days	Location	Instructor
48244	discussion-recitation	C	10:00 AM - 10:50 AM	MWF	room 106B6 Engineering Hall	Sarwate, D
48244: 3 hours						
48245	discussion-recitation	D	11:00 AM - 11:50 AM	MWF	room 260 Mechanical Engineering Bldg	Coleman, T
48245: 3 hours						

316 **Engineering Ethics** credit: 3 hours.

Ethical issues in the practice of engineering: safety and liability, professional responsibility to clients and employers, whistle-blowing, codes of ethics, career choice, and legal obligations. Philosophical analysis of normative ethical theories. Case studies. Same as PHIL 316. Credit is not given for both ECE 316 and CS 210. Junior standing is required. Prerequisite: RHET 105.

This course satisfies the General Education Criteria for a Advanced Composition, and Hist&Philosoph Perspect course.

CRN	Type	Section	Time	Days	Location	Instructor
32661	lecture-discussion	E3	09:00 AM - 10:20 AM	TR	room 57 Everitt Elec and Comp Engr Lab	Hillmer, P
32661: Advanced Composition, and Hist&Philosoph Perspect course.						
32661: 3 hours						
32662	lecture-discussion	E4	02:00 PM - 03:20 PM	TR	room 329 Gregory Hall	Hillmer, P
32662: Advanced Composition, and Hist&Philosoph Perspect course.						
32662: 3 hours						

328 **Computer Solutions EM Probs I** credit: 1 hours.

Solution of selected electromagnetics problems at the ECE 329 level using personal computers. Prerequisite: Credit or concurrent registration in ECE 329.

CRN	Type	Section	Time	Days	Location	Instructor
32669	lecture-discussion	B	09:00 AM - 09:50 AM	F	room 260 Everitt Elec and Comp Engr Lab	Franke, P
32669: 1 hours						

329 **Intro Electromagnetic Fields** credit: 3 hours.

Elementary electromagnetic field theory as summarized in Maxwell's equations for time-varying fields in integral and differential forms; energy storage; static and quasistatic fields; and time-domain analysis of waves. Prerequisite: ECE 205 or ECE 210.

CRN	Type	Section	Time	Days	Location	Instructor
32665	discussion-recitation	B	09:00 AM - 09:50 AM	MWF	room 106B6 Engineering Hall	Goddard, L
32665: 3 hours						
32666	discussion-	E	01:00 PM - 01:50	MWF	room 335	Waldrop, L

	recitation		PM		Mechanical Engineering Bldg	
32666: 3 hours						
32667	discussion-recitation	F	02:00 PM - 02:50 PM	MWF	room 241 Everitt Elec and Comp Engr Lab	Kudeki, E
32667: 3 hours						
32668	discussion-recitation	X	12:00 PM - 12:50 PM	MWF	room 260 Mechanical Engineering Bldg	Peck, T
32668: 3 hours						

**385 Digital Systems Laboratory** credit: 2 hours.

Introduction to the experimental analysis and synthesis of digital networks, including the use of a microcomputer as a controller. Prerequisite: ECE 110 and ECE 290.

Students must register for one lab and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
32769	laboratory	ABC	11:30 AM - 02:20 PM	T	room 234 Everitt Elec and Comp Engr Lab	Frank, M; Kesler, D
32770	laboratory	ABD	11:30 AM - 02:20 PM	T	room 234 Everitt Elec and Comp Engr Lab	Frank, M; Bray, N
32771	laboratory	ABE	03:00 PM - 05:50 PM	T	room 234 Everitt Elec and Comp Engr Lab	Frank, M; Han, K
32772	laboratory	ABF	03:00 PM - 05:50 PM	T	room 234 Everitt Elec and Comp Engr Lab	Frank, M; Haus, J
32773	laboratory	ABG	12:00 PM - 02:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Frank, M; Bonham, M
32774	laboratory	ABH	12:00 PM - 02:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Frank, M; Kesler, D
32775	laboratory	ABI	03:00 PM - 05:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Frank, M; Han, K
32776	laboratory	ABJ	03:00 PM - 05:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Frank, M; Kartan, S
32779	laboratory	ABM	11:30 AM - 02:20	R	room 234 Everitt	Frank, M; Bonham, M

			PM		Elec and Comp Engr Lab	
32780	laboratory	ABN	11:30 AM - 02:20 PM	R	room 234 Everitt Elec and Comp Engr Lab	Frank, M; Bonham, M
32781	laboratory	ABO	03:00 PM - 05:50 PM	R	room 234 Everitt Elec and Comp Engr Lab	Frank, M; Koehn, T
44775	laboratory	ABP	03:00 PM - 05:50 PM	R	room 234 Everitt Elec and Comp Engr Lab	Frank, M
32782	lecture	AL1	03:00 PM - 03:50 PM	M	room 1320 Digital Computer Laboratory	Frank, M

391 **Computer Systems Engineering** credit: 3 hours.

Introduction to the concepts and abstractions central to the development of modern computing systems, with an emphasis on the systems software that controls interaction between devices and other hardware and application programs. Material includes input-output semantics, synchronization, interrupts, multitasking, virtualization of abstractions. Emphasis on learning to operate effectively in teams. Credit is not given for both ECE 391 and CS 241. Prerequisite: ECE 290 or CS 231. Recommended: ECE 190.

CRN	Type	Section	Time	Days	Location	Instructor
45300	discussion-recitation	AD1	02:00 PM - 02:50 PM	T	room 169 Everitt Elec and Comp Engr Lab	Kalbarczyk, Z; Lempart, L
47023	discussion-recitation	AD2	11:00 AM - 11:50 AM	W	room 168 Everitt Elec and Comp Engr Lab	Kalbarczyk, Z; Pike, J
47024	discussion-recitation	AD3	01:00 PM - 01:50 PM	W	room 168 Everitt Elec and Comp Engr Lab	Kalbarczyk, Z; Weaver, N
45210	lecture	AL	10:30 AM - 11:45 AM	TR	room 112 Transportation Bldg	Kalbarczyk, Z

395 **Advanced Digital Projects Lab** credit: 2 or 3 hours.

Planning, designing, executing, and documenting a microcomputer-based project. Hardware is emphasized but the special projects required of student may also require an equal emphasis on software. Prerequisite: ECE 385.

CRN	Type	Section	Time	Days	Location	Instructor
32766	laboratory	A	ARRANGED			Haken, L

	lecture	A	04:00 PM - 04:50 PM	T	room 261 Everitt Elec and Comp Engr Lab	Haken, L
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396 **Honors Project** credit: 1 to 4 hours.

Special project or reading course for James Scholars in engineering. May be repeated. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10013	independent study		ARRANGED			
10013: Instructor Approval Required						

397 **Individual Study in ECE** credit: 0 to 4 hours.

Individual Projects. Approved written application to department as specified by department or instructor is required. Approved for both letter and S/U grading. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10010	independent study		ARRANGED			
10010: Instructor Approval Required						

398 **Special Topics in ECE** credit: 0 to 4 hours.

Lectures and discussions relating to new areas of interest. May be repeated if topics vary. Prerequisite: As specified for each topic offering; see Schedule or departmental course information.

CRN	Type	Section	Time	Days	Location	Instructor
48831	lecture-discussion	JC	10:00 AM - 10:50 AM	MWF	room 260 Everitt Elec and Comp Engr Lab	Choquette, K
48831: 3 hours Topic: Electronic & Photonic Devices. Prerequisites: Phys 214; and credit or concurrent registration in ECE 329. This course fulfills the ECE 440 requirement for graduation.						
46990	lecture	PV	01:30 PM - 02:50 PM	TR	room 57 Everitt Elec and Comp Engr Lab	Viswanath, P
46990: 3 hours Topic: Fundamentals of Digital Communication. Prerequisites: ECE 210 and ECE 313.						
44435	lecture	RES	10:00 AM - 11:20 AM	TR	room 245 Everitt Elec and Comp Engr Lab	Chapman, P; Gross, G

44435: 3 hours Topic: Renewable Energy Systems. Prerequisites: ECE 205 or ECE 210.

403 **Audio Engineering** credit: 3 hours.

Review of resonance and wave phenomena; acoustics of rooms and auditoriums; artificial reverberation and sound localization/spatialization; loudspeakers, enclosures, and microphones; and topics in digital audio. Prerequisite: ECE 290, ECE 410, and ECE 473.

CRN	Type	Section	Time	Days	Location	Instructor
32796	discussion-recitation	E	01:00 PM - 01:50 PM	MWF	room 245 Everitt Elec and Comp Engr Lab	Allen, J
32796: 3 hours						

410 **Digital Signal Processing I** credit: 4 hours.

Introduction to discrete-time systems and digital signal processing: discrete-time linear systems, difference equations, z-transform, discrete convolution, stability, discrete-time Fourier transform, analog-to-digital and digital-to-analog conversion, interpolation and decimation, digital filter design, discrete Fourier transform, fast Fourier transform, spectral analysis, and applications of digital signal processing. Prerequisite: ECE 210.

CRN	Type	Section	Time	Days	Location	Instructor
32797	lecture-discussion	D	02:00 PM - 03:50 PM	TR	room 165 Everitt Elec and Comp Engr Lab	Liang, Z
32797: 4 hours						
32799	lecture-discussion	G	09:00 AM - 10:50 AM	TR	room 269 Everitt Elec and Comp Engr Lab	Jones, D
32799: 4 hours						

411 **Computer Organization & Design** credit: 4 hours.

Basic computer organization and design, computer arithmetic, control design and microprogramming, memory organization, I/D design, and reliability/performance evaluation; laboratory for computer design implementation, simulation, and layout. Credit is not given toward graduate degrees in Electrical and Computer Engineering. Prerequisite: ECE 390 or CS 232.

Students must register for one lab and one discussion section.

CRN	Type	Section	Time	Days	Location	Instructor
32816	lecture	AL	03:00 PM - 04:20 PM	MW	room 165 Everitt Elec and Comp Engr Lab	Kumar, R

32815	laboratory-discussion	AY	ARRANGED			Kumar, R
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412 **Microcomputer Laboratory** credit: 3 hours.

Design, construction, and use of a small general-purpose computer with a micro-processor CPU; MSI and LSI circuits used extensively; control panel, peripheral controllers, control logic, central processor, and programming experiments; and open lab format. Prerequisite: ECE 385; ECE 390 or CS 232. Recommended: Credit or concurrent registration in ECE 411.

CRN	Type	Section	Time	Days	Location	Instructor
32801	laboratory	AB	ARRANGED			Chen, D
32802	lecture	AL	03:00 PM - 03:50 PM	TR	room 260 Everitt Elec and Comp Engr Lab	Chen, D

414 **Biomedical Instrumentation** credit: 3 hours.

Same as BIOE 414. See BIOE 414.

CRN	Type	Section	Time	Days	Location	Instructor
33724	discussion-recitation	B	11:00 AM - 11:50 AM	MWF	room 165 Everitt Elec and Comp Engr Lab	Frizzell, L
33724: 3 hours						

415 **Biomedical Instrumentation Lab** credit: 2 hours.

Same as BIOE 415. See ECE 415.

CRN	Type	Section	Time	Days	Location	Instructor
33726	laboratory	AB1	01:00 PM - 03:50 PM	T	room ARR Digital Computer Laboratory	Gentry, K
33726: This lab meets in 3107 DCL.						
33727	laboratory	AB2	01:00 PM - 03:50 PM	F	room ARR Digital Computer Laboratory	Gentry, K
33727: This lab meets in 3107 DCL.						
33728	laboratory	AB3	01:00 PM - 03:50 PM	M	room ARR Digital Computer Laboratory	Gentry, K

33728: This lab meets in 3107 DCL.

33730	lecture	AL1	12:00 PM - 12:50 PM	W	room 165 Everitt Elec and Comp Engr Lab	Gentry, K
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417 **Multimedia Signal Processing** credit: 4 hours.

Basic characteristics of speech and image signals; important analysis and synthesis tools for multimedia signal processing including subspace methods, Bayesian networks, hidden Markov models, and factor graphs; applications to biometrics (person identification), human-computer interaction (face and gesture recognition and synthesis), and audio/visual databases (indexing and retrieval). Emphasis is on a set of MATLAB machine problems which provide hands-on experience. Prerequisite: ECE 313 and ECE 410.

CRN	Type	Section	Time	Days	Location	Instructor
48228	lecture	A	09:00 AM - 10:20 AM	MW	room 344 Mechanical Engineering Bldg	Huang, T
48228: 4 hours						

418 **Image & Video Processing** credit: 4 hours.

Basic concepts and applications in image and video processing; introduction to multidimensional signal processing: sampling, Fourier transform, filtering, interpolation, and decimation; human visual perception; scanning and display of images and video; image enhancement, restoration and segmentation; digital image and video compression; and image analysis. Laboratory exercises allow students to gain hands-on experience with these topics and develop C and Matlab programs. Prerequisite: ECE 410; credit or concurrent registration in one of ECE 313, STAT 400, IE 300, MATH 461; MATH 415; experience with C programming language.

CRN	Type	Section	Time	Days	Location	Instructor
33737	laboratory	NB1	ARRANGED			Hasegawa-Johnson, M
33738	lecture	NL1	10:00 AM - 11:20 AM	TR	room 168 Everitt Elec and Comp Engr Lab	Hasegawa-Johnson, M

420 **Digital Signal Processing Lab** credit: 2 hours.

Development of real-time digital signal processing (DSP) systems using a DSP microprocessor; several structured laboratory exercises, such as sampling and digital filtering; followed by an extensive DSP project of the student's choice. Prerequisite: ECE 410.

CRN	Type	Section	Time	Days	Location	Instructor
33739	laboratory	ABA	02:00 PM - 03:50 PM	T	room 251 Everitt Elec and Comp Engr Lab	Allen, J; Shen, T; Pazos, S

33740	laboratory	ABB	02:00 PM - 03:50 PM	R	room 251 Everitt Elec and Comp Engr Lab	Allen, J; Pazos, S; Brady, S
33741	laboratory	ABC	02:00 PM - 03:50 PM	W	room 251 Everitt Elec and Comp Engr Lab	Allen, J; Shen, T; Brady, S
33744	lecture	AL1	02:00 PM - 02:50 PM	M	room 335 Mechanical Engineering Bldg	Allen, J

421 **Plasma and Fusion Science** credit: 3 hours.  
Same as NPRE 421 and PHYS 479. See NPRE 421.

CRN	Type	Section	Time	Days	Location	Instructor
34719	lecture-discussion	L	08:30 AM - 09:50 AM	TR	room 100H Talbot Laboratory	Dolan, T

422 **Computer Security I** credit: 3 or 4 hours.  
Same as CS 461. See CS 461.

CRN	Type	Section	Time	Days	Location	Instructor
48200	lecture-discussion	IA3	03:30 PM - 04:45 PM	TR	room 114 Transportation Bldg	Nicol, D; Borisov, N
48200: 3 hours						
48201	lecture-discussion	IA4	03:30 PM - 04:45 PM	TR	room 114 Transportation Bldg	Nicol, D; Borisov, N
48201: 4 hours						

425 **Intro to VLSI System Design** credit: 3 hours.  
Complementary Metal-Oxide Semiconductor (CMOS) technology and theory; CMOS circuit and logic design; layout rules and techniques; circuit characterization and performance estimation; CMOS subsystem design; Very-Large-Scale Integrated (VLSI) systems design methods; VLSI Computer Aided Design (CAD) tools; laboratory experience in custom VLSI chip design on workstations using concepts of cell hierarchy; final project involving specification, design, and evaluation of a VLSI chip or VLSI CAD program; and written report and oral presentation on the final project. Same as CS 435 and CSE 433. Prerequisite: ECE 385 and ECE 411; or CS 232.

CRN	Type	Section	Time	Days	Location	Instructor
33850	laboratory	AB1	ARRANGED			Wong, M

33853	lecture	AL1	11:00 AM - 12:20 PM	MW	room 106B1 Engineering Hall	Wong, M
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428 **Distributed Systems** credit: 3 hours.  
Same as CS 425 and CSE 424. See CS 425.

CRN	Type	Section	Time	Days	Location	Instructor
31388	lecture-discussion	T	03:30 PM - 04:45 PM	TR	room 1310 Digital Computer Laboratory	Hu, Y
31388: 3 hours						

430 **Power Ckts & Electromechanics** credit: 3 hours.  
Network equivalents, power and energy fundamentals, resonance, mutual inductance, three-phase power concepts, forces and torques of electric origin in electromagnetic and electrostatic systems, energy conversion cycles, principles of electric machines, transducers, relays, and laboratory demonstration. Credit is not given toward graduate degrees in Electrical and Computer Engineering. Prerequisite: ECE 210.

CRN	Type	Section	Time	Days	Location	Instructor
33871	discussion-recitation	C	10:00 AM - 10:50 AM	MWF	room 106B8 Engineering Hall	Sauer, P
33871: 3 hours						
33873	discussion-recitation	F	01:00 PM - 02:20 PM	TR	room 253 Mechanical Engineering Bldg	Overbye, T
33873: 3 hours						
48720	discussion-recitation	G	03:00 PM - 03:50 PM	MWF	room 241 Everitt Elec and Comp Engr Lab	Sauer, P
48720: 3 hours						

431 **Electric Machinery** credit: 4 hours.  
Theory and laboratory experimentation with three-phase power, power factor correction, single- and three-phase transformers, induction machines, DC machines, and synchronous machines; includes project work on energy control systems; digital simulation of machine dynamics. Prerequisite: ECE 430.

CRN	Type	Section	Time	Days	Location	Instructor
33876	laboratory	ABA	10:00 AM - 12:50 PM	R	room 50 Everitt Elec and Comp	Krein, P; Yeu, R

					Engr Lab	
33878	laboratory	ABB	12:00 PM - 02:50 PM	W	room 50 Everitt Elec and Comp Engr Lab	Krein, P; Friedl, A
33879	laboratory	ABC	02:00 PM - 04:50 PM	R	room 50 Everitt Elec and Comp Engr Lab	Krein, P; Sander, J
33880	lecture	AL1	11:00 AM - 11:50 AM	MWF	room 241 Everitt Elec and Comp Engr Lab	Krein, P

**435 Computer Networking Laboratory** credit: 3 or 4 hours.

Design, apply, analyze, and evaluate communication network protocols under both Linux and Windows NT operating systems. Emphasis on identifying problems, proposing alternative solutions, implementing prototypes using available network protocols and evaluating results. Students work in pairs on multiple programming projects per term. 3 undergraduate hours; or 3 to 4 graduate hours. Graduate students may receive 4 graduate hours by performing independent design projects. Prerequisite: CS 438.

CRN	Type	Section	Time	Days	Location	Instructor
33882	laboratory	C	ARRANGED			Wah, B
	lecture	C	11:00 AM - 12:20 PM	TR	room 241 Everitt Elec and Comp Engr Lab	Wah, B
: 3 hours						
33881	laboratory	C1	ARRANGED			Wah, B
	lecture	C1	11:00 AM - 12:20 PM	TR	room 241 Everitt Elec and Comp Engr Lab	Wah, B
: 4 hours						

**439 Wireless Networks** credit: 3 or 4 hours.

Overview of wireless network architectures including cellular networks, local area networks, multi-hop wireless networks such as ad hoc networks, mesh networks, and sensor networks; capacity of wireless networks; medium access control, routing protocols, and transport protocols for wireless networks; mechanisms to improve performance and security in wireless networks; energy-efficient protocols for sensor networks. Same as CS 439. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 438.

CRN	Type	Section	Time	Days	Location	Instructor
48237	lecture	B3	02:00 PM - 03:20 PM	TR	room 241 Everitt Elec and Comp Engr Lab	Vaidya, N

48237: 3 hours						
48238	lecture	B4	02:00 PM - 03:20 PM	TR	room 241 Everitt Elec and Comp Engr Lab	Vaidya, N
48238: 4 hours						

440 **Solid State Electronic Devices** credit: 3 hours.

Semiconductor materials and their electronic properties and applications to electronic devices; p-n junctions; transistors; junction field effect transistors and MOS devices; and introduction to integrated circuits. Credit is not given toward graduate degrees in Electrical and Computer Engineering. Prerequisite: PHYS 214; credit or concurrent registration in ECE 329.

CRN	Type	Section	Time	Days	Location	Instructor
33884	discussion-recitation	C	10:00 AM - 10:50 AM	MWF	room 169 Everitt Elec and Comp Engr Lab	Feng, M
33884: 3 hours						
33886	discussion-recitation	E	01:00 PM - 01:50 PM	MWF	room 243 Mechanical Engineering Bldg	Leburton, J
33886: 3 hours						
33887	discussion-recitation	G	03:00 PM - 03:50 PM	MWF	room 260 Everitt Elec and Comp Engr Lab	Tucker, J
33887: 3 hours						
33885	discussion-recitation	X	12:00 PM - 12:50 PM	MWF	room 245 Everitt Elec and Comp Engr Lab	Hsieh, K
33885: 3 hours						

441 **Physcs & Modeling Semicond Dev** credit: 3 hours.

Detailed presentation of advanced concepts such as generation-recombination, hot electron effects, and breakdown mechanisms; essential features of small ac characteristics, switching and transient behavior of p-n junctions, bipolar and MOS transistors; addresses fundamental issues for device modeling and discusses the perspective and limitations of Si-devices. Prerequisite: ECE 440.

CRN	Type	Section	Time	Days	Location	Instructor
33888	lecture-discussion	D	11:00 AM - 11:50 AM	MWF	room 260 Everitt Elec and Comp Engr Lab	Leburton, J
33888: 3 hours						

442 **Electronic Circuits** credit: 3 hours.

Analysis and design of analog and digital electronic circuits using MOS field effect transistors and bipolar junction transistors, with an emphasis on the study of amplifiers in integrated circuits. Credit is not given toward graduate degrees in Electrical and Computer Engineering. Credit is not given for both ECE 442 and PHYS 404. Prerequisite: ECE 210 and ECE 440.

CRN	Type	Section	Time	Days	Location	Instructor
33889	discussion-recitation	B	09:00 AM - 09:50 AM	MWF	room 269 Everitt Elec and Comp Engr Lab	Schutt-Aine, J
33889: 3 hours						

443 **Electronic Circuits Laboratory** credit: 1 hours.

Laboratory to accompany ECE 442. Credit is not given toward graduate degrees in Electrical and Computer Engineering. Credit is not given for both ECE 443 and PHYS 404. Prerequisite: Concurrent registration in ECE 442.

CRN	Type	Section	Time	Days	Location	Instructor
33890	laboratory	M	12:00 PM - 02:50 PM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Atkins, P
33890: 1 hours						
33892	laboratory	N	03:00 PM - 05:50 PM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Cushman, A
33892: 1 hours						
33894	laboratory	O	09:00 AM - 11:50 AM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Asok Kumar, J
33894: 1 hours						
33896	laboratory	R	03:00 PM - 05:50 PM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Cushman, A
33896: 1 hours						
33898	laboratory	S	12:00 PM - 02:50 PM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Atkins, P
33898: 1 hours						

444 **IC Device Theory & Fabrication** credit: 4 hours.

Laboratory and lecture course on the physical theory, design, and fabrication of devices suitable for integrated circuitry; includes the electrical properties of semiconductors and techniques (epitaxial growth, oxidation, photolithography diffusion, ion implantation, metallization, and characterization) for fabricating integrated circuit devices such as p-n junction diodes, bipolar transistors, and field effect transistors. Prerequisite: ECE 440.

CRN	Type	Section	Time	Days	Location	Instructor
33902	laboratory	AB1	09:00 AM - 11:50 AM	T	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Dimitrov, V
33903	laboratory	AB2	02:00 PM - 04:50 PM	T	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Dimitrov, V
33904	laboratory	AB3	09:00 AM - 11:50 AM	R	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Musick, K
33905	laboratory	AB4	02:00 PM - 04:50 PM	R	room 50M Everitt Elec and Comp Engr Lab	Sievers, D
33906	laboratory	AB5	02:00 PM - 04:50 PM	M	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; House, S
33907	laboratory	AB6	02:00 PM - 04:50 PM	W	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Lee, E
33908	laboratory	AB7	02:00 PM - 04:50 PM	F	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Wong, K
33900	discussion-recitation	AD1	09:00 AM - 09:50 AM	MWF	room 245 Everitt Elec and Comp Engr Lab	Coleman, J
33901	discussion-recitation	AD2	10:00 AM - 10:50 AM	MWF	room 245 Everitt Elec and Comp Engr Lab	Li, X

445 **Senior Design Project Lab** credit: 2 hours.

Individual design projects in various areas of electrical and computer engineering; projects are chosen by students with approval of the instructor; a written report, prepared to journal publication standards, and an oral presentation are required. Credit is not given toward graduate degrees in Electrical and Computer Engineering. For Computer Engineering and Electrical Engineering majors with senior standing.

Additional Laboratory time to be arranged in 246 Everitt Laboratory.

CRN	Type	Section	Time	Days	Location	Instructor
33909	laboratory	H	04:00 PM - 04:50 PM	W	room 1320 Digital Computer	Swenson, G

					Laboratory	
33909: 2 hours						

447 **Active Microwave Ckt Design** credit: 3 hours.

Laboratory and lecture course on microwave circuit design of amplifiers, oscillators, and mixers. Prerequisite: ECE 450 and ECE 453.

CRN	Type	Section	Time	Days	Location	Instructor
33910	laboratory	ABA	01:00 PM - 03:50 PM	W	room 251 Everitt Elec and Comp Engr Lab	Feng, M
33911	laboratory	ABB	06:00 PM - 08:50 PM	W	room 251 Everitt Elec and Comp Engr Lab	Feng, M
33912	laboratory	ABC	06:00 PM - 08:50 PM	R	room 251 Everitt Elec and Comp Engr Lab	Feng, M
33913	lecture	AL1	04:00 PM - 05:15 PM	M	room 245 Everitt Elec and Comp Engr Lab	Feng, M

448 **Artificial Intelligence** credit: 3 or 4 hours.

Same as CS 440. See CS 440.

CRN	Type	Section	Time	Days	Location	Instructor
31425	lecture-discussion	Q3	02:00 PM - 03:15 PM	TR	room 1404 Siebel Center for Comp Sci	Amir, E
31425: 3 hours						
31426	lecture-discussion	Q4	02:00 PM - 03:15 PM	TR	room 1404 Siebel Center for Comp Sci	Amir, E
31426: 4 hours						

450 **Lines, Fields, and Waves** credit: 3 hours.

General plane wave solution of Maxwell's equations; reflection and transmission of plane waves; transmission lines; impedance matching; waveguides and cavities; and radiation. Credit is not given toward graduate degrees in Electrical and Computer Engineering. Prerequisite: ECE 329.

CRN	Type	Section	Time	Days	Location	Instructor
33914	discussion-recitation	E	01:00 PM - 01:50 PM	MWF	room 260 Everitt Elec and Comp Engr Lab	Poon, A
33914: 3 hours						
33915	discussion-recitation	X	12:00 PM - 12:50 PM	MWF	room 260 Everitt Elec and Comp Engr Lab	Makela, J
33915: 3 hours						

**453 Radio Communication Circuits** credit: 4 hours.

Design of a radio system for transmission of information; types of receivers, matching techniques, receiver and antenna noise, types of modulation, high-frequency circuitry, and point-to-point and satellite communications. Prerequisite: ECE 442; credit or concurrent registration in ECE 450.

CRN	Type	Section	Time	Days	Location	Instructor
33917	laboratory	ABB	12:00 PM - 02:50 PM	T	room 251 Everitt Elec and Comp Engr Lab	Franke, S
33919	laboratory	ABC	03:00 PM - 05:50 PM	T	room 251 Everitt Elec and Comp Engr Lab	Franke, S
33918	discussion-recitation	AD1	11:00 AM - 11:50 AM	MWF	room 163 Everitt Elec and Comp Engr Lab	Franke, S

**454 Antennas** credit: 3 hours.

Antenna parameters; polarization of electromagnetic waves; basic antenna types; antenna arrays; broadband antenna design; and antenna measurements. Prerequisite: ECE 450.

CRN	Type	Section	Time	Days	Location	Instructor
33920	discussion-recitation	B	09:00 AM - 10:20 AM	TR	room 241 Everitt Elec and Comp Engr Lab	Bernhard, J
33920: 3 hours						

**457 Microwave Devices & Circuits** credit: 3 hours.

Electromagnetic wave propagation, microwave transmission systems, passive components, microwave tubes, solid state microwave devices, microwave integrated circuits, S-parameter analysis, and microstrip transmission lines. Prerequisite: ECE 440 and ECE 450.

CRN	Type	Section	Time	Days	Location	Instructor
33921	lecture	G	09:00 AM - 09:50 AM	MWF	room 241 Everitt Elec and Comp Engr Lab	Bernhard, J
33921: 3 hours						

459 **Communications I** credit: 3 hours.

Introduction to analog and digital modulation techniques, random processes, and power spectral density. Effects of noise on, and bandwidth requirements of, different modulation schemes. Prerequisite: ECE 313.

CRN	Type	Section	Time	Days	Location	Instructor
33923	discussion-recitation	R	10:00 AM - 11:20 AM	TR	room 106B1 Engineering Hall	Kamalabadi, F
33923: 3 hours						

462 **Logic Design** credit: 3 hours.

Design of combinational networks, hazards, finite state machines, design of sequential networks in fundamental mode and pulse mode, state reduction, state assignment and races, and fault detection and testing. Same as CS 462 and MATH 491. Prerequisite: ECE 290 or CS 231.

CRN	Type	Section	Time	Days	Location	Instructor
33957	discussion-recitation	C	10:00 AM - 11:20 AM	MW	room 101 Transportation Bldg	Vasudevan, S
33957: 3 hours						

463 **Digital Communications Lab** credit: 2 hours.

A laboratory course for digital communications systems. Gives hands-on experience in the configuration and performance evaluation of digital communication systems employing both radio and optical signals. Prerequisite: ECE 459. Recommended: credit or concurrent registration in ECE 461.

CRN	Type	Section	Time	Days	Location	Instructor
44200	laboratory	AB1	09:00 AM - 11:50 AM	W	room 251 Everitt Elec and Comp Engr Lab	Schmitz, C; Chang, S
44222	laboratory	AB2	01:00 PM - 03:50 PM	W	room 251 Everitt Elec and Comp Engr Lab	Schmitz, C
46653	laboratory	AB3	09:00 AM - 11:50	F	room 251 Everitt	Schmitz, C

			AM		Elec and Comp Engr Lab	
46654	laboratory	AB4	01:00 PM - 03:50 PM	F	room 251 Everitt Elec and Comp Engr Lab	Schmitz, C; Chang, S
43642	lecture	AL	09:00 AM - 09:50 AM	M	room 251 Everitt Elec and Comp Engr Lab	Schmitz, C

468 **Optical Remote Sensing** credit: 3 hours.

Introduction to Optical Remote Sensing. Optical sensors including single element and area arrays (CCDs). Systems including imager, spectrometer, interferometer, and lidar optical principles and light gathering power.

Electromagnetics of atomic and molecular emission and scattering with applications to the atmosphere as an example. Applications include ground and spacecraft platforms. Four laboratory sessions (4.5 hours each) will be arranged during the semester in lieu of four lectures. Same as AE 468 and ATMS 468. Prerequisite: ECE 210; ECE 329; PHYS 214; one of STAT 400, IE 300, ECE 313.

CRN	Type	Section	Time	Days	Location	Instructor
40643	lecture	A	11:30 AM - 12:50 PM	TR	room 260 Everitt Elec and Comp Engr Lab	Swenson, G
40643: 3 hours This course has 4 lab times that will be arranged.						

473 **Fund of Engrg Acoustics** credit: 3 or 4 hours.

Development of the basic theoretical concepts of acoustical systems; mechanical vibration, plane and spherical wave phenomena in fluid media, lumped and distributed resonant systems, and absorption phenomena and hearing. Same as TAM 413. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: MATH 285 or MATH 286.

CRN	Type	Section	Time	Days	Location	Instructor
33967	discussion-recitation	F3	02:00 PM - 02:50 PM	MWF	room 163 Everitt Elec and Comp Engr Lab	O'Brien, W
33967: 3 hours						
33968	discussion-recitation	F4	02:00 PM - 02:50 PM	MWF	room 163 Everitt Elec and Comp Engr Lab	O'Brien, W

478 **Formal Software Devel Methods** credit: 3 or 4 hours.

Same as CS 477. See CS 477.

CRN	Type	Section	Time	Days	Location	Instructor
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39766	lecture-discussion	B3	09:30 AM - 10:45 AM	TR	room 1103 Siebel Center for Comp Sci	Parthasarathy, M
39766: 3 hours						
39767	lecture-discussion	B4	09:30 AM - 10:45 AM	TR	room 1103 Siebel Center for Comp Sci	Parthasarathy, M
39767: 4 hours						

483 **Analog IC Design** credit: 3 hours.

Basic linear integrated circuit design techniques using bi-polar, JFET, and MOS technologies; operational amplifiers; wide-band feedback amplifiers; sinusoidal and relaxation oscillators; electric circuit noise; application of linear integrated circuits. Prerequisite: ECE 442.

CRN	Type	Section	Time	Days	Location	Instructor
33973	discussion-recitation	L	02:00 PM - 03:20 PM	TR	room 106B1 Engineering Hall	Chiu, Y
33973: 3 hours						

484 **Prin Adv Microelec Processing** credit: 3 hours.

Principles of advanced methods of pattern delineation, pattern transfer, and modern material growth and how these are applied to produce novel and high performance devices and circuits in various electronic materials with special emphasis on semiconductors. Issues in computer simulation of processes and the manufacturing of devices and circuits. Prerequisite: ECE 444.

CRN	Type	Section	Time	Days	Location	Instructor
33974	lecture-discussion	N	01:00 PM - 02:20 PM	MW	room 169 Everitt Elec and Comp Engr Lab	Jain, K
33974: 3 hours						

486 **Control Systems** credit: 4 hours.

Analysis and design of control systems with emphasis on modeling, state variable representation, computer solutions, modern design principles, and laboratory techniques. Prerequisite: ECE 210.

CRN	Type	Section	Time	Days	Location	Instructor
33976	laboratory	ABA	03:00 PM - 05:50 PM	T	room 235 Everitt Elec and Comp Engr Lab	Spong, M; Becker, A

33977	laboratory	ABB	11:00 AM - 01:50 PM	T	room 235 Everitt Elec and Comp Engr Lab	Spong, M; Becker, A
33978	laboratory	ABC	02:00 PM - 04:50 PM	W	room 235 Everitt Elec and Comp Engr Lab	Spong, M; Candido, S
33975	discussion-recitation	ADC	10:00 AM - 10:50 AM	MWF	room 163 Everitt Elec and Comp Engr Lab	Spong, M

488 **Compound Semicond & Devices** credit: 3 hours.

Advanced semiconductor materials and devices course covering elementary band theory, heterostructures, transport issues, three-terminal devices, two-terminal devices, including lasers and light modulators. Prerequisite: ECE 440 and ECE 450.

CRN	Type	Section	Time	Days	Location	Instructor
39332	lecture	C	10:00 AM - 10:50 AM	MWF	room 241 Everitt Elec and Comp Engr Lab	Cheng, K
39332: 3 hours						

490 **Introduction to Optimization** credit: 3 or 4 hours.

Basic theory and methods for the solution of optimization problems; iterative techniques for unconstrained minimization; and introductory presentation of linear and nonlinear programming with engineering applications. Same as CSE 441. 3 undergraduate hours. 4 graduate hours. Prerequisite: CS 101 or CS 125; MATH 241 or MATH 380.

CRN	Type	Section	Time	Days	Location	Instructor
33979	discussion-recitation	P	11:00 AM - 12:20 PM	MW	room 335 Mechanical Engineering Bldg	Kumar, P

491 **Numerical Analysis** credit: 3 or 4 hours.

Same as CS 450, CSE 401, and MATH 450. See CS 450.

CRN	Type	Section	Time	Days	Location	Instructor
31436	lecture-discussion	B3	09:00 AM - 09:50 AM	MWF	room 112 Transportation Bldg	Hirani, A
31436: 3 hours						

31438	lecture-discussion	B4	09:00 AM - 09:50 AM	MWF	room 112 Transportation Bldg	Hirani, A
31438: 4 hours						

492 **Parallel Progrmg: Sci & Engrg** credit: 3 or 4 hours.  
Same as CS 420 and CSE 402. See CS 420.

CRN	Type	Section	Time	Days	Location	Instructor
31374	lecture-discussion	D3	11:00 AM - 11:50 AM	MWF	room 1302 Siebel Center for Comp Sci	Kale, L
31374: 3 hours						
39739	lecture-discussion	D4	11:00 AM - 11:50 AM	MWF	room 1302 Siebel Center for Comp Sci	Kale, L
39739: 4 hours						

493 **Advanced Engineering Math** credit: 3 or 4 hours.  
Same as MATH 487. See MATH 487.

CRN	Type	Section	Time	Days	Location	Instructor
48923	lecture-discussion	Q13	12:00 PM - 01:20 PM	TR	room 441 Altgeld Hall	Levinson, S; Fossum, R
48923: 3 hours						
48925	lecture-discussion	Q14	12:00 PM - 01:20 PM	TR	room 441 Altgeld Hall	Levinson, S; Fossum, R
48925: 4 hours Departmental Approval Required						

495 **Proj & Lect in Quantum Electr** credit: 3 hours.  
Studies processes involving quantum mechanical energy transfers in energized media leading to various laser devices and their applications. A series of lectures, supplementing the special projects, offers background information on spectroscopy, collisional energy transfer, laser pumping schemes, modulation at optical frequencies, holography, and other related topics. Senior standing required. Prerequisite: ECE 487 recommended.

CRN	Type	Section	Time	Days	Location	Instructor
45944	laboratory	AB1	ARRANGED		room 50 Everitt Elec and Comp	Choquette, K

					Engr Lab	
45943	discussion-recitation	AD1	09:00 AM - 09:50 AM	MW	room 260 Everitt Elec and Comp Engr Lab	Choquette, K

497 **Senior Research Project** credit: 2 hours.

Individual research project under the guidance of a faculty member: for example, mathematical analysis, laboratory experiments, computer simulations, software development, circuit design, or device fabrication. Preparation of a written research proposal, which includes preliminary results. 2 undergraduate hours. ECE 497 and ECE 499 taken in sequence fulfill the Advanced Composition Requirement. No graduate credit. Prerequisite: RHET 105; consent of instructor.

This course satisfies the General Education Criteria for a Advanced Composition course.

This course is intended for Honors students and Chancellor Scholars. ECE 497 and ECE 499 are approved for General Education credit only as a sequence. Both courses must be completed to receive Advanced Composition credit.

CRN	Type	Section	Time	Days	Location	Instructor
10016	independent study		ARRANGED			
10016: Advanced Composition course. Instructor Approval Required						

498 **Special Topics in ECE** credit: 0 to 4 hours.

Lectures and discussions relating to new areas of interest. May be repeated if topics vary. Prerequisite: As specified for each topic offering; see Schedule or departmental course information.

CRN	Type	Section	Time	Days	Location	Instructor
44043	lecture	BC	09:00 AM - 09:50 AM	MWF	room 204 Transportation Bldg	Cunningham, B
44043: 3 hours Topic: Biosensors. Prerequisites: Senior or graduate standing in the department.						
48559	lecture	GT	11:30 AM - 12:50 PM	TR	room 106B1 Engineering Hall	Timp, G
48559: 3 hours Topic: Introduction to Systems Biology for Engineers. Prerequisites: MCB 100, MCB 150 or MCB 300 or equivalent recommended, Chem 102 required, Chem 104, 202, 204 recommended, ECE 486 required.						
44431	lecture	JL	10:00 AM - 11:20 AM	TR	room 106 David Kinley Hall	Lyding, J
44431: 4 hours Topic: Nanotechnology. Prerequisite: Any one of the following courses or permission of the instructor: CHEM 442, CHBE 457, ECE 440, BIOC 440 or BIOC 446, BIOP 420, CSE 485, ME 485, MSE 401, or PHYS 460.						
49759	lecture	JL3	10:00 AM - 11:20 AM	TR	room 106 David Kinley Hall	Lyding, J

49759: 3 hours Topic: Nanotechnology. Prerequisite: Any one of the following courses or permission of the instructor: CHEM 442, CHBE 457, ECE 440, BIOC 440 or BIOC 446, BIOP 420, CSE 485, ME 485, MSE 401, or PHYS 460.

48523	lecture	MO	10:00 AM - 10:50 AM	MWF	room 165 Everitt Elec and Comp Engr Lab	Oelze, M
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48523: 3 hours Topic: Biomedical Ultrasound Imaging. Prerequisites: ECE 280 and 329 or consent of instructor.

499 **Senior Thesis** credit: 2 hours.

Completion of the research project begun under ECE 497. Preparation and oral presentation of a written thesis that reports the results of the project. 2 undergraduate hours. To fulfill the Advanced Composition Requirement, credit must be earned for both ECE 497 and ECE 499. No graduate credit. Prerequisite: ECE 497 and consent of instructor.

This course satisfies the General Education Criteria for a Advanced Composition course.

CRN	Type	Section	Time	Days	Location	Instructor
10018	independent study		ARRANGED			

10018: Advanced Composition course. Instructor Approval Required

500 **Graduate Seminar** credit: 0 hours.

Required of all graduate students. Approved for S/U grading only.

CRN	Type	Section	Time	Days	Location	Instructor
33981	lecture	U	04:00 PM - 04:50 PM	R	room 151 Everitt Elec and Comp Engr Lab	Fisher, L; Gross, G
40290	lecture	U1	04:00 PM - 04:50 PM	R	room 151 Everitt Elec and Comp Engr Lab	Fisher, L; Gross, G
33982	lecture	U2	04:00 PM - 04:50 PM	R	room 151 Everitt Elec and Comp Engr Lab	Fisher, L; Gross, G

513 **Vector Space Signal Processing** credit: 4 hours.

Rigorous presentation of key mathematical tools in a vector space framework, including: finite and infinite dimensional vector spaces, Hilbert spaces, orthogonal projections, subspace techniques, least-squares methods, matrix decomposition, conditioning and regularizations, bases and frames, the Hilbert space of random variables, random processes, iterative methods; and their applications in signal processing, including: inverse problems, filter design, sampling, interpolation, sensor array processing, and signal and spectral estimation. Prerequisite: ECE 313, ECE 410, and MATH 415.

CRN	Type	Section	Time	Days	Location	Instructor
44849	lecture	D	11:00 AM - 12:20 PM	MW	room 57 Everitt Elec and Comp Engr Lab	Bresler, Y
44849: 4 hours						

515 **Control System Theory & Design** credit: 4 hours.

Fundamental course on feedback control systems, which emphasizes state space techniques. Basic principles, modeling, analysis, stability, structural properties, optimization and design to meet specifications. Prerequisite: ECE 486.

CRN	Type	Section	Time	Days	Location	Instructor
33983	discussion-recitation	N	10:00 AM - 11:20 AM	TR	room 163 Everitt Elec and Comp Engr Lab	Basar, M
33983: 4 hours						

520 **EM Waves & Radiating Systems** credit: 4 hours.

Fundamental electromagnetic theory with applications to transmission lines, waveguides, and antennas; introduction to the solution of advanced problems in static electric and magnetic fields. Prerequisite: ECE 452.

CRN	Type	Section	Time	Days	Location	Instructor
33984	discussion-recitation	E	03:00 PM - 04:20 PM	MW	room 106B6 Engineering Hall	Cangellaris, A
33984: 4 hours						

528 **Analysis of Nonlinear Systems** credit: 4 hours.

First-level graduate course on the analysis on nonlinear dynamical systems, covering topics such as nonlinear dynamics, vector fields and flows, Lyapunov stability theory, regular and singular perturbations, averaging, integral manifolds, input-output and input-to-state stability, and various design applications in control systems and robotics. Same as GE 520 and ME 546. Prerequisite: ECE 515 and MATH 285.

CRN	Type	Section	Time	Days	Location	Instructor
33986	discussion-recitation	R	01:00 PM - 02:20 PM	TR	room 168 Everitt Elec and Comp Engr Lab	Stipanovic, D
33986: 4 hours						

533 **Parallel Computer Architecture** credit: 4 hours.  
 Same as CS 533 and CSE 522. See CS 533.

CRN	Type	Section	Time	Days	Location	Instructor
31613	lecture-discussion	S	09:30 AM - 10:45 AM	TR	room 1304 Siebel Center for Comp Sci	Torrellas, J
31613: 4 hours						

534 **Random Processes** credit: 4 hours.  
 Basic concepts of random processes; linear systems with random inputs; Markov processes; spectral analysis; Wiener and Kalman filtering; applications to systems engineering. Prerequisite: One of ECE 313, MATH 461, STAT 400.

CRN	Type	Section	Time	Days	Location	Instructor
33989	discussion-recitation	F	02:30 PM - 03:50 PM	MW	room 106B8 Engineering Hall	Veeravalli, V
33989: 4 hours						

536 **Integ Optics & Optoelectronics** credit: 4 hours.  
 Integrated optical and optoelectronic devices; theory of optical devices including laser sources, waveguides, photodetectors, and modulations of these devices. Prerequisite: One of ECE 455, ECE 487, PHYS 486. Recommended: ECE 488.

CRN	Type	Section	Time	Days	Location	Instructor
33990	discussion-recitation	N	10:00 AM - 11:20 AM	TR	room 260 Everitt Elec and Comp Engr Lab	Chuang, S
33990: 4 hours						

542 **Fault-Tolerant Dig Syst Design** credit: 4 hours.  
 Advanced concepts in hardware and software fault tolerance; topics addressed include fault models, coding in computer systems, module and system level fault detection mechanism, reconfiguration techniques in multiprocessor systems and VLSI processor arrays, and software fault tolerance techniques such as recovery blocks, N-version programming, checkpointing, and recovery; survey of practical fault-tolerant systems. Same as CS 536. Prerequisite: ECE 411.

CRN	Type	Section	Time	Days	Location	Instructor
33991	lecture-	C	10:00 AM - 11:20	MW	room 106B3	Iyer, R

	discussion		AM		Engineering Hall	
33991: 4 hours						

548 **Models of Cognitive Processes** credit: 4 hours.  
Same as CS 548. See CS 548.

CRN	Type	Section	Time	Days	Location	Instructor
31617	lecture-discussion	R	12:30 PM - 01:45 PM	TR	room 1131 Siebel Center for Comp Sci	Dejong, G
31617: 4 hours						

549 **Computer Vision** credit: 4 hours.  
Examines information processing approaches to computer vision, algorithms, and architectures for artificial intelligence and robotics systems capable of vision: inference of three-dimensional properties of a scene from its images, such as distance, orientation, motion, size and shape, acquisition, and representation of spatial information for navigation and manipulation in robotics. Same as CS 543. Prerequisite: ECE 448 or CS 225.

CRN	Type	Section	Time	Days	Location	Instructor
33994	lecture-discussion	R	01:00 PM - 02:15 PM	TR	room 103 Transportation Bldg	Forsyth, D

553 **Optimum Control Systems** credit: 4 hours.  
Theoretical and algorithmic foundations of deterministic optimal control theory, including calculus of variations, maximum principle, and principle of optimality; the Linear-Quadratic-Gaussian design; differential games and H-infinity optimal control design. Prerequisite: ECE 313 and ECE 515.

CRN	Type	Section	Time	Days	Location	Instructor
33998	discussion-recitation	N	12:30 PM - 01:50 PM	MW	room 241 Everitt Elec and Comp Engr Lab	Ma, Y
33998: 4 hours						

558 **Digital Imaging** credit: 4 hours.  
Multidimensional signals, convolution, transforms, sampling, and interpolation; design of two-dimensional digital filters; sensor array processing and range-doppler imaging; applications to synthetic aperture radar, optics, tomography, radio astronomy, and beam-forming sonar; image estimation from partial data. Prerequisite: ECE 313 and ECE 410.

CRN	Type	Section	Time	Days	Location	Instructor
34000	discussion-recitation	D	09:30 AM - 10:50 AM	MW	room 57 Everitt Elec and Comp Engr Lab	Do, M
34000: 4 hours						

561 **Detection & Estimation Theory** credit: 4 hours.

Introduction to detection and estimation theory, with applications to communication, control, and radar systems; decision-theory concepts and optimum-receiver principles; detection of random signals in noise, coherent and noncoherent detection; and parameter estimation, linear and nonlinear estimation, and filtering. Prerequisite: ECE 534.

CRN	Type	Section	Time	Days	Location	Instructor
34003	discussion-recitation	E	01:00 PM - 02:20 PM	MW	room 252 Mechanical Engineering Bldg	Moulin, P
34003: 4 hours						

567 **Communication Network Analysis** credit: 4 hours.

First high-level course in performance analysis and design of multiple-user communication systems; emphasizes rigorous formulation and analytical and computational methods; includes queuing networks, decentralized minimum delay routing, and dynamic network flow control. Prerequisite: CS 438; one of ECE 534, MATH 464, MATH 564.

CRN	Type	Section	Time	Days	Location	Instructor
39337	discussion-recitation	C	02:00 PM - 03:20 PM	MW	room 245 Everitt Elec and Comp Engr Lab	Srikant, R
39337: 4 hours						

570 **Nonlinear Optics** credit: 4 hours.

Light propagation in anisotropic crystals; second- and third-order nonlinear susceptibility and electro-optic effect; and discussion of the relationship of these effects along with such applications as light modulation, harmonic generation, and optical parametric amplification and oscillation. Prerequisite: ECE 520.

CRN	Type	Section	Time	Days	Location	Instructor
43648	lecture	A	01:00 PM - 02:20 PM	TR	room 170 Everitt Elec and Comp Engr Lab	Carney, P
43648: 4 hours						

579 **Computational Complexity** credit: 4 hours.  
 Same as CS 579 and MATH 578. See CS 579.

CRN	Type	Section	Time	Days	Location	Instructor
41445	lecture-discussion	F	11:00 AM - 12:15 PM	TR	room 1302 Siebel Center for Comp Sci	Prabhakaran, M
41445: 4 hours						

580 **Optimiz by Vector Space Methds** credit: 4 hours.  
 Introduction to normed, Banach, and Hilbert spaces; applications of the projection theorem and the Hahn-Banach Theorem to problems of minimum norm, least squares estimation, mathematical programming, and optimal control; the Kuhn-Tucker Theorem and Pontryagin's maximum principle; introduction to iterative methods. Same as MATH 587. Prerequisite: MATH 415 or MATH 482; MATH 447.

CRN	Type	Section	Time	Days	Location	Instructor
40722	lecture-discussion	D1	11:00 AM - 12:20 PM	MW	room 106B6 Engineering Hall	Meyn, S

585 **MOS Device Modeling & Design** credit: 4 hours.  
 Techniques for characterizing gate oxide and interface properties and reliability, I-V models for circuit simulation, design for control of short channel effects, silicon-on-insulator, and new device structures. Prerequisite: ECE 441.

CRN	Type	Section	Time	Days	Location	Instructor
34009	lecture	D	11:30 AM - 12:50 PM	MW	room 170 Everitt Elec and Comp Engr Lab	Rosenbaum, E
34009: 4 hours						

590 **Grad Sem in Special Topics** credit: 0 to 2 hours.  
 Lectures and discussions on current research and literature on advanced topics in electrical engineering. Approved for S/U grading only. May be repeated. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
34012	lecture	B	04:00 PM - 04:50 PM	T	room 269 Everitt Elec and Comp Engr Lab	Schutt-Aine, J

34012: Topic: Electromagnetics, Optics and Remote Sensing.						
47758	lecture	C	02:00 PM - 03:50 PM	F	room 169 Everitt Elec and Comp Engr Lab	Ahuja, N
47758: 1 hours Topic: Computer Vision. This seminar will be given in 3169 Beckman Institute.						
34010	lecture	D	04:00 PM - 04:50 PM	T	room 3269 Beckman Institute	O'Brien, W
34010: Topic: Bioacoustics.						
34013	lecture	G	04:00 PM - 04:50 PM	W	room B2 Coordinated Science Lab	Choquette, K
34013: Topic: Microelectronics II. The location of this seminar is 1000 MNTL.						
45608	lecture	H	ARRANGED			Eden, J
45608: Topic: Gaseous Electronics.						
34014	lecture	I	04:00 PM - 04:50 PM	M	room 50 Everitt Elec and Comp Engr Lab	Gross, G
34014: Topic: Power Systems.						
34011	lecture	P	04:00 PM - 04:50 PM	W	room 2269 Beckman Institute	Do, M
34011: Topic: Signal and Image Processing.						
34015	lecture	X	04:00 PM - 04:50 PM	T	room B2 Coordinated Science Lab	Kumar, R
34015: Topic: Computer Systems Seminar.						

594 **Math Models of Language** credit: 3 or 4 hours.

Mathematical models of linguistic structure and their implementation in computational algorithms used in automatic speech understanding and speech synthesis. Statistical and automata theoretic techniques are studied allowing a quantitative description of acoustic-phonetics, phonology, phonotactics, lexicons, syntax, and semantics. The methods are used to build components of a speech understanding system. Same as LING 594. For 4 hours credit, an extended project is required. Prerequisite: ECE 537.

CRN	Type	Section	Time	Days	Location	Instructor
34016	lecture	B	09:00 AM - 09:50 AM	MWF	room 170 Everitt Elec and Comp Engr Lab	Levinson, S

596 **Master's Project** credit: 1 to 8 hours.

Graduate-level individual or team projects in electrical and computer engineering emphasizing advanced engineering analysis and design. May be repeated to a maximum of 16 hours. Only 4 hours of ECE 496 can be included in the 32 hours required for the M. S. degree in Electrical Engineering. Credit in ECE 496 cannot be included in the 64 post-M. S. hours required for the Ph.D. degree in Electrical Engineering. Students with deferred credit for ECE 599 may not register in ECE 596 without consent of the ECE department.

CRN	Type	Section	Time	Days	Location	Instructor
10020	independent study		ARRANGED			
10020: Instructor Approval Required						

597 **Individual Study in ECE** credit: 1 to 8 hours.

Individual projects. Approved written application to department as specified by department or instructor is required. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10023	independent study		ARRANGED			
10023: Instructor Approval Required						

598 **Special Topics in ECE** credit: 0 to 4 hours.

Lectures and discussions relating to new areas of interest. May be repeated if topics vary. Prerequisite: As specified for each topic offering; see Schedule or departmental course information.

CRN	Type	Section	Time	Days	Location	Instructor
48745	laboratory	BB	ARRANGED			Milenkovic, O
48743	lecture	BL	03:00 PM - 04:20 PM	TR	room 163 Everitt Elec and Comp Engr Lab	Milenkovic, O
48743: 4 hours Topic: Information and coding theory in bioinformatics. Prerequisites: ECE 313, required CS 498SS & ECE 563 recommended.						
48773	lecture	CP	02:00 PM - 03:20 PM	MW	room 1302 Siebel Center for Comp Sci	Polychronopoulos, C
48773: 4 hours Topic: Design of 4G WWANs and their building blocks-Intelligent Routers. Prerequisites: ECE/CS 438 or equivalent, and ECE 391 or ECE 411 or equivalent.						
48568	lecture	EP	11:00 AM - 12:20 PM	TR	room 1105 Siebel Center for Comp Sci	Pop, E

48568: 4 hours Topic: Hot Chips: Atoms to Heat Sinks. Prerequisites: ECE 440, senior-level quantum physics, Matlab programming (or equivalents).

49031	lecture	NA	02:30 PM - 03:50 PM	MW	room 344 Mechanical Engineering Bldg	Ahuja, N
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49031: 4 hours Topic: Image Structure, Content and Depiction. Prerequisites: ECE/CS 448 or equivalent; ECE 418 or equivalent; ECE 413, Math 461, Stat 410 or equivalent; CS 225 or equivalent programming experience.

39341	lecture	PLC	12:30 PM - 01:50 PM	TR	room 241 Everitt Elec and Comp Engr Lab	Chapman, P
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39341: 4 hours Topic: Advanced Power Electronics. Prerequisites: ECE 464 Power Electronics, ECE 515 Control Systems.

48551	lecture	SB	11:30 AM - 12:50 PM	TR	room 168 Everitt Elec and Comp Engr Lab	Shanbhag, N; Bae, H
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48551: 4 hours Topic: High-Speed Clock and Data Recovery Systems. Prerequisites: ECE 442 required, ECE 483 recommended.

599 **Thesis Research** credit: 0 to 16 hours.  
Approved for S/U grading only. May be repeated.

CRN	Type	Section	Time	Days	Location	Instructor
10025	independent study		ARRANGED			
10025: Instructor Approval Required						