

Course Schedule - Fall 2006

Electrical and Computer Engineering

101 **Exploring Digital Info Tech** 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 students enrolled in Electrical or Computer Engineering

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

CRN	Type	Section	Time	Days	Location	Instructor
45173	laboratory	ABA	08:00 AM - 09:50 AM	F	room 268 Everitt Elec and Comp Engr Lab	Schmitz, C; Ho, W
45173: Physical Sciences course.						
45174	laboratory	ABB	10:00 AM - 11:50 AM	F	room 268 Everitt Elec and Comp Engr Lab	Schmitz, C; Narayanan, S
45174: Physical Sciences course.						
45175	laboratory	ABC	01:00 PM - 02:50 PM	F	room 268 Everitt Elec and Comp Engr Lab	Schmitz, C; Ho, W
45175: Physical Sciences course.						
45176	laboratory	ABD	03:00 PM - 04:50 PM	F	room 268 Everitt Elec and Comp Engr Lab	Schmitz, C; Narayanan, S
45176: Physical Sciences course.						
45172	lecture	AL	11:00 AM - 11:50 AM	TR	room 218 Mechanical Engineering Bldg	Schmitz, C
45172: Physical Sciences course.						

110 **Intro Elec & Comp 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 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
36778	laboratory	AB1	09:00 AM - 11:50 AM	M	room 146 Everitt Elec and Comp Engr Lab	Franke, P

36780	laboratory	AB2	09:00 AM - 11:50 AM	W	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36781	laboratory	AB3	09:00 AM - 11:50 AM	F	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36783	laboratory	AB4	08:00 AM - 10:50 AM	T	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36785	laboratory	AB5	11:30 AM - 02:20 PM	T	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36788	laboratory	AB6	11:30 AM - 02:20 PM	R	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36789	lecture	AL1	03:00 PM - 03:50 PM	MWF	room 151 Everitt Elec and Comp Engr Lab	Brunet, M; Loui, M
36792	laboratory	BB1	02:00 PM - 04:50 PM	M	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36794	laboratory	BB2	02:00 PM - 04:50 PM	W	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36796	laboratory	BB3	02:00 PM - 04:50 PM	F	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36798	laboratory	BB4	08:00 AM - 10:50 AM	R	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36800	laboratory	BB5	03:00 PM - 05:50 PM	T	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36801	laboratory	BB6	03:00 PM - 05:50 PM	R	room 146 Everitt Elec and Comp Engr Lab	Franke, P
36790	lecture	BL1	01:00 PM - 01:50 PM	MWF	room 151 Everitt Elec and Comp Engr Lab	Brunet, M

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. Credit is not given for both ECE 190 and CS 125.

CRN	Type	Section	Time	Days	Location	Instructor
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44251	discussion-recitation	AD1	03:00 PM - 03:50 PM	F	room 143 Everitt Elec and Comp Engr Lab	Lumetta, S; Becker, A
44252	discussion-recitation	AD2	03:00 PM - 03:50 PM	F	room 168 Everitt Elec and Comp Engr Lab	Lumetta, S; Hussain, A
44253	discussion-recitation	AD3	03:00 PM - 03:50 PM	F	room 170 Everitt Elec and Comp Engr Lab	Lim, B; Lumetta, S
44254	discussion-recitation	AD4	09:00 AM - 09:50 AM	F	room 170 Everitt Elec and Comp Engr Lab	Lumetta, S
44255	discussion-recitation	AD5	12:00 PM - 12:50 PM	F	room 170 Everitt Elec and Comp Engr Lab	Lumetta, S; Johnson, D
44236	lecture-discussion	AE1	09:00 AM - 10:20 AM	TR	room 1320 Digital Computer Laboratory	Lumetta, S

200 Seminar Credit: 0 hours.

Discussions of educational programs, career opportunities, and other topics in electrical and computer engineering. For ECE students. Approved for S/U grading only.

CRN	Type	Section	Time	Days	Location	Instructor
29836	lecture	SH	05:00 PM - 06:50 PM	W	room 151 Everitt Elec and Comp Engr Lab	Hutchinson, S
29836: This course does not meet the first two weeks of the semester.						

205 Intro Elec & Electr 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. ECE students may not receive credit for this course. Prerequisite: PHYS 212.

CRN	Type	Section	Time	Days	Location	Instructor
31717	lecture	A	08:00 AM - 08:50 AM	MWF	room 269 Everitt Elec and Comp Engr Lab	Zhang, J
31720	lecture	F	02:00 PM - 02:50 PM	MWF	room 100 Materials Science and Eng Bld	Choi, H

206 Intro Elec & Electr Ckts Lab Credit: 1 hours.

Laboratory instruments and basic measurement techniques, electric circuits, CMOS logic circuits, DTL and TTL circuits, and op-amps. ECE students may not receive credit for this course. Prerequisite: PHYS 212; concurrent registration in ECE 205.

CRN	Type	Section	Time	Days	Location	Instructor
36694	laboratory	F1	08:00 AM - 09:50 AM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Graunke, C
36836	laboratory	F10	06:00 PM - 07:50 PM	W	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Bunge, B
36834	laboratory	F11	06:00 PM - 07:50 PM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Wong, V
36831	laboratory	F2	10:00 AM - 11:50 AM	M	room 268 Everitt Elec and Comp Engr Lab	Liu, J; Zhang, J
36830	laboratory	F3	12:00 PM - 01:50 PM	M	room 268 Everitt Elec and Comp Engr Lab	Liu, Y; Zhang, J
36828	laboratory	F4	08:00 AM - 09:50 AM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Sanchez, J
36827	laboratory	F5	10:00 AM - 11:50 AM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Sanchez, J
36825	laboratory	F6	10:00 AM - 11:50 AM	W	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Zhong, Y
36824	laboratory	F7	01:00 PM - 02:50 PM	W	room 268 Everitt Elec and Comp Engr Lab	Liu, J; Zhang, J
36822	laboratory	F8	06:00 PM - 07:50 PM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Bunge, B
36820	laboratory	F9	06:00 PM - 07:50 PM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Wong, V

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. Prerequisite: ECE 110 and PHYS 212; credit or concurrent registration in MATH 385.

Students must register for one lab and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
36863	laboratory	AB1	10:00 AM - 11:50 AM	M	room 234 Everitt Elec and Comp Engr Lab	Mitofsky, A
36891	laboratory	AB2	10:00 AM - 11:50 AM	M	room 234 Everitt Elec and Comp Engr Lab	Mitofsky, A
36867	laboratory	AB3	12:00 PM - 01:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Hamschin, B
36874	laboratory	AB4	12:00 PM - 01:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Chen, Y; Hamschin, B
36875	laboratory	AB5	02:00 PM - 03:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Mitofsky, A; Chen, Y
36881	laboratory	AB6	02:00 PM - 03:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Mitofsky, A; Chen, Y
36878	laboratory	AB7	04:00 PM - 05:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Barot, S; Hamschin, B
36888	laboratory	AB8	04:00 PM - 05:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Barot, S; Hamschin, B
36888: This is a LAS Learning Community section.						
36883	laboratory	AB9	06:00 PM - 07:50 PM	T	room 234 Everitt Elec and Comp Engr Lab	Barot, S; Jalan, A
36709	laboratory	ABA	06:00 PM - 07:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Chen, Y; Hamschin, B
36717	laboratory	ABB	06:00 PM - 07:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Chen, Y; Hamschin, B
36696	lecture	AL1	09:00 AM - 09:50 AM	MTWF	room 269 Everitt Elec and Comp Engr Lab	Basar, T
36702	lecture	AL2	10:00 AM - 10:50 AM	MTWF	room 269 Everitt Elec and Comp Engr Lab	Mitofsky, A
36706	lecture	AL3	01:00 PM - 01:50 PM	MTWF	room 269 Everitt Elec and Comp Engr Lab	Kudeki, E

211 Topics Analog Ckts & 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. Students may not receive credit for both ECE 211 and ECE 210. Prerequisite: ECE 110 and PHYS 212; credit or concurrent registration in MATH 385.

CRN	Type	Section	Time	Days	Location	Instructor
31722	lecture	B	09:00 AM - 09:50 AM	MTWTF	room 269 Everitt Elec and Comp Engr Lab	Basar, T
31722: Meets 23-Aug-06 - 13-Oct-06.						
31723	lecture	C	10:00 AM - 10:50 AM	MTWTF	room 269 Everitt Elec and Comp Engr Lab	Allen, J
31723: Meets 23-Aug-06 - 13-Oct-06.						
31725	lecture	E	01:00 PM - 01:50 PM	MTWTF	room 269 Everitt Elec and Comp Engr Lab	Kudeki, E
31725: Meets 23-Aug-06 - 13-Oct-06.						

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
36928	discussion-recitation	AD2	09:00 AM - 09:50 AM	R	room 241 Everitt Elec and Comp Engr Lab	Brown, D; Wah, B; Musick, K
36925	discussion-recitation	AD3	10:00 AM - 10:50 AM	R	room 241 Everitt Elec and Comp Engr Lab	Brown, D; Wah, B; Ha, T
36922	discussion-recitation	AD4	11:00 AM - 11:50 AM	R	room 241 Everitt Elec and Comp Engr Lab	Brown, D; Wah, B; Earnhart, M
36919	discussion-recitation	AD5	12:00 PM - 12:50 PM	R	room 241 Everitt Elec and Comp Engr Lab	Brown, D; Wah, B; Watson, B
36917	discussion-recitation	AD6	01:00 PM - 01:50 PM	R	room 241 Everitt Elec and Comp Engr Lab	Brown, D; Wah, B; Herman, G
36914	discussion-	AD7	02:00 PM - 02:50	R	room 241 Everitt	Brown, D; Wah, B;

	recitation		PM		Elec and Comp Engr Lab	Lundgren, E
36895	discussion-recitation	AD8	03:00 PM - 03:50 PM	R	room 143 Everitt Elec and Comp Engr Lab	Brown, D; Wah, B; Hansen, M
36719	lecture	AL1	09:00 AM - 09:50 AM	MW	room 1320 Digital Computer Laboratory	Brown, D; Wah, B

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; case studies. Same as PHIL 316.

Prerequisite: Junior standing; 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
36862	lecture-discussion	E2	09:00 AM - 10:20 AM	TR	room 170 Everitt Elec and Comp Engr Lab	Hillmer, P
36862: Advanced Composition, and Hist&Philosoph Perspect course.						
36869	lecture-discussion	E3	02:00 PM - 03:20 PM	TR	room 329 Gregory Hall	Hillmer, P
36869: Advanced Composition, and Hist&Philosoph Perspect course.						

317 Intro ECE Tech & Management Credit: 3 hours.

The goal of this course is to equip non-engineering business-oriented students with the technical skills to become competitive as businesspersons in a technology-driven market. To accomplish this goal, this course will aim to provide a basic understanding of electrical and computer engineering concepts. An incomplete list of topics includes: basic circuit components, dc fundamentals, ac fundamentals, semiconductors, operational amplifiers, device fabrication, power distribution, digital devices, and computer architecture (including microprocessors). A relatively low level of mathematical ability (first term calculus) is assumed. This course is designed for the Business Majors in the Technology and Management program. Credit is not given to students enrolled in Electrical or Computer Engineering. Prerequisite: One of MATH 220, MATH 221, MATH 234; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29838	lecture	G	03:30 PM - 04:50 PM	MW	room 106B6 Engineering Hall	Peck, T

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
31727	discussion-recitation	C	10:00 AM - 10:50 AM	MWF	room 260 Everitt Elec and Comp Engr Lab	Frizzell, L
31729	discussion-recitation	E	01:00 PM - 01:50 PM	MWF	room 245 Everitt Elec and Comp Engr Lab	Kim, K
31732	discussion-recitation	X	12:00 PM - 12:50 PM	MWF	room 269 Everitt Elec and Comp Engr Lab	Cunningham, B

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
36843	laboratory	AB1	12:00 PM - 02:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Lu, Z
36856	laboratory	AB2	03:00 PM - 05:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Swamy, B
36821	laboratory	AB3	03:00 PM - 05:50 PM	R	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Swamy, B
36823	laboratory	AB4	08:00 AM - 10:50 AM	R	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Lu, Z
36826	laboratory	AB5	11:30 AM - 02:20 PM	R	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Bray, N
36835	laboratory	AB6	12:00 PM - 02:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Bonham, M
36829	laboratory	AB7	03:00 PM - 05:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Yong, S
36838	laboratory	AB8	03:00 PM - 05:50 PM	R	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Yong, S
36860	laboratory	AB9	08:00 AM - 10:50 AM	R	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Sartori, J
36728	laboratory	ABA	11:30 AM - 02:20 PM	R	room 234 Everitt Elec and Comp	Patel, J; Bonham, M

					Engr Lab	
36737	laboratory	ABB	03:00 PM - 05:50 PM	T	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Nawaz, N
36773	laboratory	ABC	03:00 PM - 05:50 PM	T	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Sartori, J
36805	laboratory	ABE	11:30 AM - 02:20 PM	T	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Kempf, S
36806	laboratory	ABF	11:30 AM - 02:20 PM	T	room 234 Everitt Elec and Comp Engr Lab	Patel, J; Bray, N
36720	lecture	AL1	04:00 PM - 04:50 PM	M	room 151 Everitt Elec and Comp Engr Lab	Patel, J

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. Prerequisite: ECE 290 or CS 331. Recommended: ECE 190.

CRN	Type	Section	Time	Days	Location	Instructor
47766	laboratory	AB1	ARRANGED			Polychronopoulos, C
47765	lecture	AL	10:30 AM - 11:45 AM	TR	room 151 Everitt Elec and Comp Engr Lab	Polychronopoulos, C

395 **Adv 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 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29852	laboratory	A	ARRANGED			Haken, L
	lecture	A	11:00 AM - 11:50 AM	F	room 261 Everitt Elec and Comp Engr Lab	Haken, L
: Topic: Digital Projects						

396 Honors Project Credit: 1 to 4 hours.

Special project or reading course for James Scholars in engineering. May be repeated. Prerequisite: James Scholar in engineering; 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 for both letter and S/U grading. Prerequisite: Approved written application to department as specified by department or 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. Approved for both letter and S/U grading. 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
47491	lecture	RS	02:00 PM - 03:20 PM	MW	room 106B3 Engineering Hall	Sproat, R
47491: 3 hours Topic: Speech Technology. Prerequisites: ECE 210						

402 Electronic Music Synthesis Credit: 3 hours.

Historical survey of electronic and computer music technology; parameters of musical expression and their codification; analysis and synthesis of fixed sound spectra; time-variant spectrum analysis/synthesis of musical sounds; algorithms for dynamic sound synthesis. Prerequisite: MUS 103 or equivalent; ECE 290; ECE 410.

CRN	Type	Section	Time	Days	Location	Instructor
29932	discussion-recitation	L	08:30 AM - 09:50 AM	TR	room 245 Everitt Elec and Comp Engr Lab	Haken, L

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 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
31741	lecture	E	01:00 PM - 02:20 PM	WF	room 165 Everitt Elec and Comp Engr Lab	Liang, Z
	lecture	E	01:00 PM - 01:50 PM	M	room 165 Everitt Elec and Comp Engr Lab	Liang, Z
31743	lecture	G	03:00 PM - 04:20 PM	WF	room 165 Everitt Elec and Comp Engr Lab	Kamalabadi, F
	lecture	G	03:00 PM - 03:50 PM	M	room 165 Everitt Elec and Comp Engr Lab	Kamalabadi, F

411 *Comp 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 Engineering. Prerequisite: ECE 390 or CS 232.

Students must register for one lab and one discussion section.

CRN	Type	Section	Time	Days	Location	Instructor
29937	laboratory	AB1	ARRANGED			Carter, N
29942	discussion-recitation	AD1	03:00 PM - 04:20 PM	MW	room 269 Everitt Elec and Comp Engr Lab	Carter, N

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
29945	laboratory	AB1	ARRANGED			Hwu, W
29947	lecture	AL1	03:00 PM - 03:50 PM	TR	room 260 Everitt Elec and Comp Engr Lab	Hwu, W

413 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. Credit is not given toward graduate degrees in Electrical Engineering. Prerequisite: ECE 210.

CRN	Type	Section	Time	Days	Location	Instructor
31745	discussion-recitation	C	10:00 AM - 10:50 AM	MWF	room 106B3 Engineering Hall	Sarwate, D
31818	discussion-recitation	D	11:00 AM - 11:50 AM	MWF	room 106B6 Engineering Hall	Sarwate, D

414 Biomedical Instrumentation Credit: 3 hours.

Introduction to engineering aspects of the detection, acquisition, processing, and display of signals from living systems; biomedical transducers for measurements of biopotentials, ions and gases in aqueous solution, force, displacement, blood pressure, blood flow, heart sounds, respiration, and temperature; and therapeutic and prosthetic devices. Same as BIOE 414. Prerequisite: ECE 205 or ECE 210 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
39237	lecture	B	10:00 AM - 10:50 AM	MWF	room 1310 Digital Computer Laboratory	Fish, R

415 Biomedical Instrumentation Lab Credit: 2 hours.

Laboratory to accompany ECE 414. Studies medical instrumentation and transducers for static and dynamic nonbiological inputs and measures actual biomedical signals; requires some animal experiments. Same as BIOE 415. Prerequisite: Credit or concurrent registration in ECE 414.

CRN	Type	Section	Time	Days	Location	Instructor
39239	laboratory	AB1	01:00 PM - 03:50 PM	T	room ARR Digital Computer Laboratory	Fish, R; Reddy, R
39239: This lab meets in 3107 DCL.						
39240	laboratory	AB2	09:00 AM - 11:50 AM	R	room ARR Digital Computer Laboratory	Fish, R; Coussot, C
39240: This lab meets in 3107 DCL.						
39241	laboratory	AB3	01:00 PM - 03:50 PM	R	room ARR Digital Computer Laboratory	Fish, R; Thalji, S
39241: This lab meets in 3107 DCL.						

39242	laboratory	AB4	01:00 PM - 03:50 PM	W	room ARR Digital Computer Laboratory	Fish, R; Thalji, S
39242: This lab meets in 3107 DCL.						
39238	lecture	AL1	10:00 AM - 10:50 AM	T	room 218 Mechanical Engineering Bldg	Fish, R

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
31821	laboratory	AB1	02:00 PM - 03:50 PM	T	room 251 Everitt Elec and Comp Engr Lab	Kleffner, M; Bresler, Y; Ko, G
31826	laboratory	AB2	02:00 PM - 03:50 PM	R	room 251 Everitt Elec and Comp Engr Lab	Kleffner, M; Bresler, Y; Ko, G
31829	laboratory	AB3	02:00 PM - 03:50 PM	W	room 251 Everitt Elec and Comp Engr Lab	Bresler, Y; Shen, T; Tidemann, J
31833	laboratory	AB4	03:00 PM - 04:50 PM	F	room 251 Everitt Elec and Comp Engr Lab	Bresler, Y; Shen, T; Tidemann, J
31840	lecture	AL1	02:00 PM - 02:50 PM	M	room 165 Everitt Elec and Comp Engr Lab	Bresler, Y

425 *Intro 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
48121	laboratory	AB1	ARRANGED			Wong, M
36897	lecture	AL1	01:00 PM - 02:20 PM	TR	room 260 Everitt Elec and Comp Engr Lab	Wong, M

428 **Distributed Systems** Credit: 3 hours.
 Same as CS 425 and CSE 424. See CS 425.

CRN	Type	Section	Time	Days	Location	Instructor
36102	lecture-discussion	P	11:00 AM - 12:15 PM	TR	room 1304 Siebel Center for Comp Sci	Gupta, I

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 Engineering. Prerequisite: ECE 210.

CRN	Type	Section	Time	Days	Location	Instructor
31846	discussion-recitation	C	03:00 PM - 03:50 PM	MWF	room 106B1 Engineering Hall	Chapman, P
31849	discussion-recitation	N	02:00 PM - 02:50 PM	MWF	room 241 Everitt Elec and Comp Engr Lab	Sauer, P

438 **Communication Networks** Credit: 3 hours.

Same as CS 438 and CSE 425. See CS 438.

CRN	Type	Section	Time	Days	Location	Instructor
36066	lecture-discussion	X	02:00 PM - 03:15 PM	WF	room 1105 Siebel Center for Comp Sci	Borisov, N
36066: 3 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 Engineering. Prerequisite: PHYS 214; credit or concurrent registration in ECE 329.

CRN	Type	Section	Time	Days	Location	Instructor
36932	discussion-recitation	D	11:00 AM - 11:50 AM	MWF	room 163 Everitt Elec and Comp Engr Lab	Tucker, J
36939	discussion-	E	01:00 PM - 01:50	MWF	room 163 Everitt	Feng, M

	recitation		PM		Elec and Comp Engr Lab	
36944	discussion-recitation	G	03:00 PM - 03:50 PM	MWF	room 260 Everitt Elec and Comp Engr Lab	Cheng, K
36937	discussion-recitation	X	12:00 PM - 12:50 PM	MWF	room 165 Everitt Elec and Comp Engr Lab	Hsieh, K

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 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
29950	lecture	D	11:00 AM - 11:50 AM	MWF	room 269 Everitt Elec and Comp Engr Lab	Rosenbaum, E

443 *Electronic Circuits Laboratory* Credit: 1 hours.

Laboratory to accompany ECE 442. Credit is not given toward graduate degrees in Electrical 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
31856	laboratory	M	09:00 AM - 11:50 AM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Cushman, A
31857	laboratory	N	12:00 PM - 02:50 PM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Atkins, P
31859	laboratory	O	03:00 PM - 05:50 PM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Lobdell, B
31862	laboratory	P	12:00 PM - 02:50 PM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Cushman, A
31864	laboratory	Q	03:00 PM - 05:50 PM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Ni, J

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
36808	laboratory	AB1	02:00 PM - 04:50 PM	F	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Aquino-Lugo, A
36809	laboratory	AB2	08:00 AM - 10:50 AM	T	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Anil Kumar, -
36819	laboratory	AB3	12:00 PM - 02:50 PM	T	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Anil Kumar, -
36817	laboratory	AB4	02:00 PM - 04:50 PM	W	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Lu, M
36816	laboratory	AB5	09:00 AM - 11:50 AM	R	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Wayne, M
36814	laboratory	AB6	02:00 PM - 04:50 PM	M	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Siriani, D
41682	laboratory	AB7	02:00 PM - 04:50 PM	R	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Yen, G
36813	discussion-recitation	AD1	09:00 AM - 09:50 AM	MWF	room 245 Everitt Elec and Comp Engr Lab	Coleman, J
36811	discussion-recitation	AD2	10:00 AM - 10:50 AM	MWF	room 245 Everitt Elec and Comp Engr Lab	Lyding, J

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 Engineering. Prerequisite: Senior standing in ECE.

Additional Laboratory time to be arranged in 246 Everitt Laboratory.

CRN	Type	Section	Time	Days	Location	Instructor
29951	laboratory	H	04:00 PM - 04:50 PM	W	room 119 Materials Science and Eng Bld	Makela, J

448 Intro Artificial Intelligence Credit: 3 or 4 hours.
Same as CS 440. See CS 440.

CRN	Type	Section	Time	Days	Location	Instructor
36055	lecture-discussion	Q3	12:30 PM - 01:45 PM	TR	room 1404 Siebel Center for Comp Sci	Amir, E
36055: 3 hours						
36059	lecture-discussion	Q4	12:30 PM - 01:45 PM	TR	room 1404 Siebel Center for Comp Sci	Amir, E
36059: 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 Engineering. Prerequisite: ECE 329.

CRN	Type	Section	Time	Days	Location	Instructor
31866	discussion-recitation	D	11:00 AM - 11:50 AM	MWF	room 260 Everitt Elec and Comp Engr Lab	Chew, W
31868	discussion-recitation	X	12:00 PM - 12:50 PM	MWF	room 335 Mechanical Engineering Bldg	Ravaioli, U

451 Adv Microwave Measurements Credit: 3 hours.

Manual- and computer-controlled laboratory analysis of circuits at microwave frequencies. Prerequisite: ECE 450.

CRN	Type	Section	Time	Days	Location	Instructor
31870	laboratory	AB1	09:00 AM - 11:50 AM	T	room 249 Everitt Elec and Comp Engr Lab	Schutt-Aine, J
31874	laboratory	AB2	02:00 PM - 04:50 PM	T	room 249 Everitt Elec and Comp Engr Lab	Schutt-Aine, J
31878	laboratory	AB3	01:00 PM - 03:50 PM	R	room 249 Everitt Elec and Comp Engr Lab	Schutt-Aine, J
31881	laboratory	AB4	08:00 AM - 10:50 AM	R	room 249 Everitt Elec and Comp Engr Lab	Schutt-Aine, J

31885	lecture	AL1	12:00 PM - 12:50 PM	MWF	room 260 Everitt Elec and Comp Engr Lab	Schutt-Aine, J
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452 *Electromagnetic Fields* Credit: 3 hours.

Plane waves at oblique incidence, wave polarization, anisotropic media, radiation, space communications, and waveguides. Prerequisite: ECE 450.

CRN	Type	Section	Time	Days	Location	Instructor
29954	discussion-recitation	N	10:00 AM - 11:20 AM	TR	room 165 Everitt Elec and Comp Engr Lab	Chuang, S

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
39244	laboratory	AB1	09:00 AM - 11:50 AM	T	room 251 Everitt Elec and Comp Engr Lab	Franke, S; Bornhoff, W
39245	laboratory	AB2	03:00 PM - 05:50 PM	T	room 251 Everitt Elec and Comp Engr Lab	Franke, S; Bornhoff, W
39246	laboratory	AB3	09:00 AM - 11:50 AM	R	room 251 Everitt Elec and Comp Engr Lab	Franke, S; Minin, S
39243	lecture	AL1	11:00 AM - 11:50 AM	MWF	room 245 Everitt Elec and Comp Engr Lab	Franke, S

455 *Optical Electronics* Credit: 3 or 4 hours.

Optical beams and cavities; semiclassical theory of gain; characteristics of typical lasers (gas, solid state, and semiconductor); and application of optical devices. 3 undergraduate hours. 4 graduate hours. Prerequisite: ECE 450 or PHYS 436 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29956	discussion-recitation	G4	09:00 AM - 10:20 AM	MW	room 260 Mechanical Engineering Bldg	Eden, J
29956: 4 hours						

43395	lecture	UG3	09:00 AM - 10:20 AM	MW	room 260 Mechanical Engineering Bldg	Eden, J
43395: 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 413 or equivalent.

CRN	Type	Section	Time	Days	Location	Instructor
29959	lecture-discussion	R	01:30 PM - 02:50 PM	TR	room 165 Everitt Elec and Comp Engr Lab	Basar, T

460 *Optical Imaging* Credit: 3 hours.

Introduction to visible and infrared imaging systems covering fields, optical elements, electronic sensors, and embedded processing systems. Lectures and labs cover active and passive illumination, ranging, holography, polarization, coherence, spectroscopy, and sampling with an emphasis on electronic optomechanical control and data acquisition. Prerequisite: ECE 329; credit or concurrent registration in ECE 413 or STAT 400.

CRN	Type	Section	Time	Days	Location	Instructor
39248	laboratory	AB1	ARRANGED		room 50H Everitt Elec and Comp Engr Lab	Bishop, S
39249	laboratory	AB2	ARRANGED		room 50H Everitt Elec and Comp Engr Lab	Bishop, S
39250	laboratory	AB3	ARRANGED		room 50H Everitt Elec and Comp Engr Lab	Bishop, S
39247	lecture	AL1	02:00 PM - 02:50 PM	MW	room 1111 Siebel Center for Comp Sci	Bishop, S

461 *Communications, II* Credit: 3 hours.

Digital communication systems, modulation, demodulation, channel models, bit error rate, spectral occupancy, synchronization, equalization, and trellis-coded modulation. Prerequisite: ECE 459.

CRN	Type	Section	Time	Days	Location	Instructor
29961	discussion-recitation	R	01:30 PM - 02:50 PM	TR	room 163 Everitt Elec and Comp Engr Lab	Veeravalli, V

464 Power Electronics Credit: 3 hours.

Switching functions and methods of control such as pulse-width modulation, phase control, and phase modulation; dc-dc, ac-dc, dc-ac, and ac-ac power converters; power components, including magnetic components and power semiconductor switching devices. Prerequisite: ECE 442.

CRN	Type	Section	Time	Days	Location	Instructor
29963	discussion-recitation	B	09:00 AM - 09:50 AM	MWF	room 260 Everitt Elec and Comp Engr Lab	Krein, P

469 Power Electronics Laboratory Credit: 2 hours.

Laboratory study of circuits and devices used for switching power converters, solid-state motor drives, and power controllers, including dc-dc, ac-dc, and dc-ac converters and applications; high-power transistors and magnetic components; design considerations, including heat transfer. Prerequisite: ECE 443 or consent of instructor; credit or concurrent registration in ECE 464.

CRN	Type	Section	Time	Days	Location	Instructor
31888	laboratory	AB1	10:00 AM - 12:50 PM	T	room 50 Everitt Elec and Comp Engr Lab	Chapman, P
31891	laboratory	AB2	12:00 PM - 02:50 PM	W	room 50 Everitt Elec and Comp Engr Lab	Chapman, P
31893	lecture	AL1	12:00 PM - 12:50 PM	M	room 50 Everitt Elec and Comp Engr Lab	Krein, P

470 Introduction to Robotics Credit: 4 hours.

Fundamentals of robotics, rigid motions, homogeneous transformations, forward and inverse kinematics, velocity kinematics, motion planning, trajectory generation, sensing, vision, and control. Same as CS 443, GE 421, and ME 445. Prerequisite: MATH 415 or MATH 418; ECE 210 or GE 320; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
36913	laboratory	AB1	01:00 PM - 02:50 PM	T	room 316 Transportation Bldg	Holm, J
36943	laboratory	AB2	01:00 PM - 02:50 PM	R	room 316 Transportation Bldg	Holm, J
41536	laboratory	AB3	03:00 PM - 04:50 PM	T	room 316 Transportation Bldg	Holm, J

36956	lecture	AL1	11:30 AM - 12:50 PM	TR	room 260 Everitt Elec and Comp Engr Lab	Hutchinson, S
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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 385 or equivalent.

CRN	Type	Section	Time	Days	Location	Instructor
36985	discussion-recitation	G4	02:00 PM - 02:50 PM	MWF	room 163 Everitt Elec and Comp Engr Lab	O'Brien, W
36973	discussion-recitation	U3	02:00 PM - 02:50 PM	MWF	room 163 Everitt Elec and Comp Engr Lab	O'Brien, W
36973: 3 hours						

476 Power System Analysis Credit: 3 hours.

Examines the development of power system equivalents, per phase network analysis, load flow, symmetrical components, sequence networks, fault analysis, and digital simulation. Prerequisite: ECE 430.

CRN	Type	Section	Time	Days	Location	Instructor
29964	discussion-recitation	R	01:00 PM - 02:20 PM	TR	room 245 Everitt Elec and Comp Engr Lab	Sauer, P

480 Magnetic Resonance Imaging Credit: 3 or 4 hours.

Fundamental physical, mathematical, and computational principles governing the data acquisition and image reconstruction of magnetic resonance imaging. Same as BIOE 480. 3 undergraduate hours. 3 or 4 graduate hours. Approved for both letter and S/U grading. Prerequisite: ECE 410 recommended.

CRN	Type	Section	Time	Days	Location	Instructor
45265	lecture	S	02:30 PM - 03:50 PM	TR	room 245 Everitt Elec and Comp Engr Lab	Sutton, B

482 Digital IC Design Credit: 3 hours.

Bipolar and MOS field effect transistor characteristics; VLSI fabrication techniques for MOS and bipolar circuits; calculation of circuit parameters from the process parameters; and design of VLSI circuits such as logic, memories, charge-coupled devices, and A/D and D/A converters. Prerequisite: ECE 290 and ECE 442.

CRN	Type	Section	Time	Days	Location	Instructor
29966	discussion-recitation	G	03:00 PM - 03:50 PM	MWF	room 163 Everitt Elec and Comp Engr Lab	Shanbhag, N

485 Intro MEM Devices & Systems Credit: 3 hours.

Course presents an introduction to the principles, fabrication techniques, and applications of microelectromechanical systems (MEMS). Students will gain an in-depth understanding of sensors and actuator principles and integrated microfabrication techniques for MEMS. It also consists of a comprehensive investigation of the state-of-the-art MEMS devices and systems. Same as IE 485 and ME 485. Prerequisite: Senior standing in the College of Engineering.

CRN	Type	Section	Time	Days	Location	Instructor
36987	lecture	C	10:00 AM - 11:20 AM	MW	room 252 Mechanical Engineering Bldg	Liu, C
36987: 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 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
31775	laboratory	AB1	03:00 PM - 05:50 PM	R	room 235 Everitt Elec and Comp Engr Lab	Tang, X; Spong, M
31777	laboratory	AB2	03:00 PM - 05:50 PM	T	room 235 Everitt Elec and Comp Engr Lab	Spong, M; Maggio, D
31778	laboratory	AB3	09:00 AM - 11:50 AM	R	room 235 Everitt Elec and Comp Engr Lab	Tang, X; Spong, M
31772	discussion-recitation	AD1	10:00 AM - 10:50 AM	MWF	room 163 Everitt Elec and Comp Engr Lab	Spong, M

487 Intro Quantum Electr for EEs Credit: 3 hours.

Application of quantum mechanical concepts to electronics problems; detailed study of a calculable two-state laser system; and incidental quantum ideas bearing on electronics. Prerequisite: PHYS 485 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29968	discussion-	C	10:00 AM - 10:50	MWF	room 169 Everitt	Timp, G

	recitation		AM		Elec and Comp Engr Lab	
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491 *Intro to 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
36027	lecture- discussion	B3	09:00 AM - 09:50 AM	MWF	room 1310 Digital Computer Laboratory	Bond, S
36027: 3 hours						
36036	lecture- discussion	B4	09:00 AM - 09:50 AM	MWF	room 1310 Digital Computer Laboratory	Bond, S
36036: 4 hours						

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. No graduate credit. Prerequisite: Senior standing; 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.						
10016: Instructor Approval Required						
48703	independent study	JAR	ARRANGED			Rogers, J
48703: Advanced Composition course.						

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
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47637	laboratory	AB1	02:30 PM - 05:00 PM	W	room 251 Everitt Elec and Comp Engr Lab	Makela, J
47638	laboratory	AB2	02:30 PM - 05:00 PM	R	room 251 Everitt Elec and Comp Engr Lab	Makela, J
47432	lecture	AL1	10:00 AM - 10:50 AM	MWF	room 203 Transportation Bldg	Makela, J
47432: 3 hours Topic: Global Positioning Systems. Prerequisites: ECE 329.						
47430	lecture	MO	10:00 AM - 10:50 AM	MWF	room 57 Everitt Elec and Comp Engr Lab	Oelze, M
47430: 3 hours Topic: Biomedical Ultrasound Imaging. Prerequisites: ECE 473, 210, 280 or consent of instructor.						
47825	lecture	YH3	11:00 AM - 12:15 PM	TR	room 1103 Siebel Center for Comp Sci	Hu, Y
47825: 3 hours Topic: Computer Security. Prerequisite: CS 498, Information Assurance. This section is for either undergraduate or graduate students.						
47826	lecture	YH4	11:00 AM - 12:15 PM	TR	room 1103 Siebel Center for Comp Sci	Hu, Y
47826: 4 hours Topic: Computer Security. Prerequisite: CS 498, Information Assurance. This section is for graduate students only.						

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. Approved for both letter and S/U grading. No graduate credit. Prerequisite: ECE 497 and consent of instructor.

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

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
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
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29981	lecture	U	04:00 PM - 04:50 PM	R	room 151 Everitt Elec and Comp Engr Lab	Fisher, L
41517	lecture	U2	04:00 PM - 04:50 PM	R	room 151 Everitt Elec and Comp Engr Lab	Fisher, L
41517: Sections U2 meets in 151 Everitt Lab.						
41518	lecture	U3	04:00 PM - 04:50 PM	R	room 151 Everitt Elec and Comp Engr Lab	Fisher, L
41518: Sections U3 meets in 151 Everitt Lab.						

511 Computer Architecture Credit: 4 hours.

Advanced concepts in computer architecture; design, management, and modeling of memory hierarchies, stack-oriented processors, associative processors, pipelined computers, and multiple processor systems; and focuses on hardware alternatives in detail and their relation to system performance/cost. Same as CSE 521. Prerequisite: ECE 411 or CS 433 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
37011	discussion-recitation	F	02:00 PM - 03:20 PM	MW	room 106B8 Engineering Hall	Frank, M

515 Control Syst Theory & Design Credit: 4 hours.

Synthesis of feedback control systems to meet design specifications, including sensitivity; multivariable systems; introduction to systems with random inputs; state variable techniques; and nonlinear systems. Prerequisite: ECE 486 or equivalent; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29983	discussion-recitation	N	08:30 AM - 09:50 AM	TR	room 253 Mechanical Engineering Bldg	Basar, M

517 Nonlinear & Adaptive Control Credit: 4 hours.

Studies design of nonlinear control systems based on stability considerations; examines Lyapunov and hyperstability approaches to analysis and design of model reference adaptive systems; identifiers, observers, and controllers for unknown plants. Prerequisite: ECE 515.

CRN	Type	Section	Time	Days	Location	Instructor
30430	discussion-recitation	P	11:30 AM - 12:50 PM	MW	room 169 Everitt Elec and Comp Engr Lab	Kumar, P

30430: 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
29985	discussion-recitation	D	11:00 AM - 12:20 PM	MW	room 106B3 Engineering Hall	Jin, J

532 Comp Semicond and Diode Lasers Credit: 4 hours.

Compound semiconductor materials and their optical properties. Diode lasers are discussed in detail including quantum well heterostructure lasers, strained layer lasers, and quantum wire and quantum dot lasers. Current topics in diode laser development are included. Prerequisite: ECE 440 and PHYS 486. Recommended ECE 455; credit or concurrent registration in ECE 536.

CRN	Type	Section	Time	Days	Location	Instructor
29987	discussion-recitation	C	10:00 AM - 10:50 AM	MWF	room 170 Everitt Elec and Comp Engr Lab	Coleman, J

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 413, MATH 461, STAT 400; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29989	discussion-recitation	C	10:00 AM - 11:20 AM	MW	room 165 Everitt Elec and Comp Engr Lab	Coleman, T

535 Theory Semicond & Devices Credit: 4 hours.

Introductory quantum mechanics of semiconductors; energy bands; dynamics of Bloch electrons in static and high-frequency electric and magnetic fields; equilibrium statistics; transport theory, diffusion, drift, and thermoelectric effects; and characteristics of p-n junctions, heterojunctions, and transistor devices. Same as PHYS 565. Prerequisite: Senior-level course in quantum mechanics or atomic physics.

CRN	Type	Section	Time	Days	Location	Instructor
37127	discussion-recitation	E	01:00 PM - 01:50 PM	MWF	room 241 Everitt Elec and Comp Engr Lab	Leburton, J

537 *Speech Processing* Credit: 4 hours.

Introduction to the theory and techniques in speech processing and recognition; includes speech production model, spectral analysis, pattern comparison techniques, hidden Markov models (HMM), and HMM-based automatic speech recognition; also includes computer laboratory. Prerequisite: ECE 410 and ECE 534; experience with C programming and UNIX systems.

CRN	Type	Section	Time	Days	Location	Instructor
29993	lecture	E	01:00 PM - 01:50 PM	MWF	room 169 Everitt Elec and Comp Engr Lab	Allen, J

541 *Computer Systems Analysis* Credit: 4 hours.

Development of analytical models of computer systems and application of such models to performance evaluation; topics include scheduling policies, paging algorithms, multiprogrammed resource management, and queuing theory. Same as CS 541 and CSE 524. Prerequisite: MATH 461 or MATH 463; ECE 413 or equivalent.

CRN	Type	Section	Time	Days	Location	Instructor
35928	lecture-discussion	B	09:30 AM - 10:45 AM	TR	room 1302 Siebel Center for Comp Sci	Sanders, W; Nicol, D

544 *Topics in Signal Processing* Credit: 4 hours.

Lectures and discussions related to advanced topics and new areas of interest in signal processing; including speech, image and multidimensional processing. May be repeated 8 hours in a term to a total of 20 hours. Students may not receive additional credit towards a degree from multiple offerings of this course if those offerings have significant overlap, as determined by the ECE department. Prerequisite: As specified each semester or consent of instructor. It is expected that each offering will have a 500-level course as prerequisite or co-requisite.

CRN	Type	Section	Time	Days	Location	Instructor
47953	lecture	PM	01:30 PM - 02:50 PM	TR	room 344 Mechanical Engineering Bldg	Moulin, P
47953: 4 hours Topic: Statistical Image and Video Processing. Prerequisite: ECE 534, ECE 418, or ECE 547, experience with Matlab. Recommended: ECE 561, ECE 551.						

545 *Advanced Physical Acoustics* Credit: 4 hours.

Advanced topics in acoustics including physical properties of a fluid; linear propagation phenomena; nonlinear phenomena such as radiation force, streaming, and harmonic generation; cavitation; and absorption and dispersion. Same as TAM 515. Prerequisite: One of ECE 473, ECE 520, TAM 518, or equivalent; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
40637	lecture-discussion	A	01:00 PM - 01:50 PM	MWF	room 170 Everitt Elec and Comp	Oelze, M; O'Brien, W

					Engr Lab	
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547 Topics in Image Processing Credit: 4 hours.

Examines fundamental concepts, techniques, and directions of research in image processing; topics include two-dimensional Fourier transform and filtering, image digitization, coding, restoration, reconstruction, analysis, and recognition. Same as CSE 543. Prerequisite: ECE 410 and ECE 413; or equivalent.

CRN	Type	Section	Time	Days	Location	Instructor
37129	discussion-recitation	O	11:30 AM - 12:50 PM	TR	room 165 Everitt Elec and Comp Engr Lab	Huang, T

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 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
37131	lecture-discussion	A	12:30 PM - 01:45 PM	TR	room 2269 Beckman Institute	Li, F

551 Digital Signal Processing II Credit: 4 hours.

Reviews basic concepts of digital signals and systems; examines computer-aided digital filter design, quantization effects, decimation and interpolation, and fast algorithms for convolution and the DFT; and introduces adaptive signal processing. Same as CSE 542. Prerequisite: ECE 410 and ECE 413; or equivalent.

CRN	Type	Section	Time	Days	Location	Instructor
37133	discussion-recitation	F	03:00 PM - 03:50 PM	R	room 165 Everitt Elec and Comp Engr Lab	Jones, D
	discussion-recitation	F	03:00 PM - 04:50 PM	T	room 165 Everitt Elec and Comp Engr Lab	Jones, D

552 Numerical Circuit Analysis Credit: 4 hours.

Formulation of circuit equations; sparse matrix algorithms for the solution of large systems, AC, DC, and transient analysis of electrical circuits; sensitivity analysis; decomposition methods. Same as CSE 532. Prerequisite: MATH 415 and ECE 210.

CRN	Type	Section	Time	Days	Location	Instructor
37135	discussion-recitation	F	01:00 PM - 02:20 PM	MW	room 260 Everitt Elec and Comp Engr Lab	Wong, M

556 Coding Theory Credit: 4 hours.

General discussion on coding theory with emphasis on the algebraic theory of cyclic codes using finite field arithmetic, decoding of BCH and RS codes, finite field Fourier transform and algebraic geometry codes, convolutional codes and trellis decoding algorithms. Same as CS 577 and MATH 579. Prerequisite: MATH 417 or equivalent or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
37137	discussion-recitation	L	08:30 AM - 09:50 AM	MW	room 163 Everitt Elec and Comp Engr Lab	Koetter, R

559 Topics in Communications Credit: 4 hours.

Lectures and discussion related to advanced topics and new areas of interest in the theory of communication systems, including information theory, coding theory, and communication network theory. May be repeated in the same term as topics vary, to a maximum of 12 graduate hours; may be repeated in separate terms as topics vary, to a maximum of 16 graduate hours. Two or more sections of this course may be offered in a term with different outlines. Students registering in more than one section should receive credit separately for each section. Students will not receive additional credit toward a degree from multiple offerings of this course if those offerings have significant overlap, as determined by the Electrical and Computer Engineering department. Prerequisite: Specified each semester or consent of instructor. (It is expected that each offering will have a 500-level course as a prerequisite or co-requisite.)

CRN	Type	Section	Time	Days	Location	Instructor
43234	lecture	PV	10:00 AM - 11:20 AM	MW	room 1109 Siebel Center for Comp Sci	Viswanath, P

563 Information Theory Credit: 4 hours.

Mathematical models for channels and sources; entropy, information, data compression, channel capacity, Shannon's theorems, and rate-distortion theory. Same as CS 578 and STAT 563. Prerequisite: MATH 466 or ECE 534 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
37140	discussion-recitation	A	01:30 PM - 02:50 PM	MW	room 196 Lincoln Hall	Srikant, R

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; ECE 534 or MATH 466; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29998	discussion-recitation	C	01:30 PM - 02:50 PM	MW	room 256 Mechanical Engineering Bldg	Hajek, B

569 Diffraction, Coherence & Info Credit: 4 hours.

Analysis of information encoding, transmission, and decoding in spatially complex optical systems. Analysis of digital and analog imaging, holography, and interferometry. Analysis of physical and electronic transformations in imaging systems. Discussion of multiplex imaging and imaging transformations. Prerequisite: ECE 460 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29999	discussion-recitation	S	01:00 PM - 02:20 PM	TR	room 169 Everitt Elec and Comp Engr Lab	Carney, P

572 Quantum Electronics Credit: 4 hours.

Brief theoretical introduction to quantum mechanics and atomic physics, with many applications in spin resonance and modern maser theory. Prerequisite: PHYS 485 recommended.

CRN	Type	Section	Time	Days	Location	Instructor
46737	discussion-recitation	B	09:00 AM - 09:50 AM	MWF	room 241 Everitt Elec and Comp Engr Lab	Choquette, K
46737: 4 hours						

580 Optimization by Vector Methods Credit: 4 hours.

Same as MATH 587. See MATH 587.

CRN	Type	Section	Time	Days	Location	Instructor
33577	lecture-discussion	N	11:00 AM - 12:20 PM	MW	room 260 Mechanical Engineering Bldg	Basar, M

588 Electricity Resource Planning Credit: 4 hours.

Techniques in electricity resource planning including methodologies for reliability evaluation and assessment, production costing, marginal costing, supply-side and demand-side planning, integrated planning, and planning under competition. Prerequisite: MATH 415, ECE 413, and ECE 476; or consent of instructor

CRN	Type	Section	Time	Days	Location	Instructor
39252	discussion-recitation	L	10:00 AM - 11:20 AM	TR	room 245 Everitt Elec and Comp Engr Lab	Gross, G
39252: 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. May be repeated. Approved for S/U grading only. Prerequisite: Advanced standing; consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
36950	lecture	B	04:00 PM - 05:20 PM	T	room 269 Everitt Elec and Comp Engr Lab	Jin, J
36950: Topic: Antennas, Electromagnetics Optics and Remote Sensing.						
36946	lecture	D	04:00 PM - 04:50 PM	T	room 3269 Beckman Institute	O'Brien, W
36946: Topic: Bioacoustics.						
36952	lecture	G	04:00 PM - 04:50 PM	W	room B2 Coordinated Science Lab	Lyding, J
36952: Topic: Microelectronics II.						
36955	lecture	H	ARRANGED			Eden, J
36955: Topic: Gaseous Electronics.						
36953	lecture	I	04:00 PM - 04:50 PM	M	room 50 Everitt Elec and Comp Engr Lab	Gross, G
36953: Topic: Power Systems.						
36957	lecture	P	04:00 PM - 05:20 PM	W	room 2269 Beckman Institute	Do, M
36957: Topic: Signal and Image Processing.						
37015	lecture	X	04:00 PM - 05:20 PM	T	room B2 Coordinated Science Lab	Vaidya, N
37015: Topic: Computer Systems Seminar.						

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. Prerequisite: Graduate standing in ECE. 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. 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. Approved for both letter and S/U grading. 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
47823	laboratory	AB	ARRANGED			Hasegawa-Johnson, M
47821	lecture	AL	01:00 PM - 03:50 PM	M	room 1105 Siebel Center for Comp Sci	Hasegawa-Johnson, M
47821: 4 hours Topic: The Speech Chain. Prerequisites: SHS 301 or LING 401. "No credit for ECE students"						
47910	laboratory	BB	ARRANGED			Chen, D
47508	lecture	BL	10:00 AM - 11:20 AM	TR	room 260 Everitt Elec and Comp Engr Lab	Chen, D
47508: 4 hours Topic: Design and Synthesis for System-on-a-chip. Prerequisites: ECE 425 (or equivalent), ECE 391 (or equivalent), C++ programming.						
47915	laboratory	CB	ARRANGED			Poon, A
47771	lecture	CL	02:30 PM - 03:50 PM	TR	room 1109 Siebel Center for Comp Sci	Poon, A

47771: 4 hoursTopic: Communication IC Design. Prerequisites: ECE 459 or ECE 425 or equivalent.						
48318	lecture	DM	06:00 PM - 07:20 PM	MTWR	Room 114 Transportation Bldg	Hajek, B
48318: 3 hoursTopic: Convex Analysis and Optimization. Prerequisites: Math 415 and Math 447 (i.e., a course in linear algebra and a course in real analysis) or consent of instructor. The first class will be held on Monday, October 30th.Meets 30-Oct-06 - 08-Dec-06.						
40259	lecture	GG	11:30 AM - 12:50 PM	TR	room 245 Everitt Elec and Comp Engr Lab	Gross, G
40259: 4 hoursTopic: Analysis Techniques for Large-Scale Electrical Systems. Prerequisites: ECE 476 and ECE 464 or consent of instructor.						
48120	lecture- discussion	KJ	01:00 PM - 02:20 PM	MW	room 143 Everitt Elec and Comp Engr Lab	Jain, K
48120: 4 hoursTopic: Microlithography: Science, Technology, and Applications. Prerequisites: ECE 444 or 460, or Physics 402, or MSE 462, or ME 498, or consent of instructor.						
37027	lecture	NA	11:30 AM - 12:50 PM	TR	room 253 Mechanical Engineering Bldg	Hasegawa-Johnson, M
37027: 4 hoursTopic: Pattern Recognition. Prerequisite: Math 415 or equivalent; ECE 413, Math 461 or Stat 400 or equivalent; and CS 225, ECE 390 or equivalent programming experience.						
44042	lecture	YC	03:30 PM - 04:50 PM	TR	room 1105 Siebel Center for Comp Sci	Chiu, Y
44042: 4 hoursTopic: CMOS A-D Interface Circuits. Prerequisites: ECE 483, ECE 410.						

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

CRN	Type	Section	Time	Days	Location	Instructor
10025	independent study		ARRANGED			
10025: Instructor Approval Required						
48841	independent study	PK	ARRANGED			Kwiat, P