

# Course Schedule - Fall 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, and Quant Reasoning II 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; Johnson, M
45173: Physical Sciences, and Quant Reasoning II course.						
45174	laboratory	ABB	10:00 AM - 11:50 AM	F	room 268 Everitt Elec and Comp Engr Lab	Schmitz, C; Johnson, M
45174: Physical Sciences, and Quant Reasoning II course.						
45175	laboratory	ABC	01:00 PM - 02:50 PM	F	room 268 Everitt Elec and Comp Engr Lab	Schmitz, C; Silver, A
45175: Physical Sciences, and Quant Reasoning II course.						
45176	laboratory	ABD	03:00 PM - 04:50 PM	F	room 268 Everitt Elec and Comp Engr Lab	Schmitz, C; Silver, A
45176: Physical Sciences, and Quant Reasoning II course.						
45172	lecture	AL	11:00 AM - 11:50 AM	TR	room 253 Mechanical Engineering Bldg	Schmitz, C
45172: Physical Sciences, and Quant Reasoning II course.						
51928	lecture	AL2	11:00 AM - 11:50 AM	TR	room 253 Mechanical Engineering Bldg	Schmitz, C
51928: Discovery, Physical Sciences, and Quant Reasoning II course. First year Discovery Program course. Registration restricted to freshman. Students should only enroll in one discovery 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
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	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 structures. Credit is not given for both ECE 190 and CS 125. Prerequisite: ECE 110.

CRN	Type	Section	Time	Days	Location	Instructor
44251	discussion-recitation	AD1	03:00 PM - 03:50 PM	F	room 257 Everitt Elec and Comp Engr Lab	Lumetta, S; Hwu, W; Obeid, N
44252	discussion-recitation	AD2	03:00 PM - 03:50 PM	F	room 170 Everitt Elec and Comp Engr Lab	Lumetta, S; Hwu, W; Truty, W
44253	discussion-recitation	AD3	03:00 PM - 03:50 PM	F	room 260 Everitt Elec and Comp Engr Lab	Lumetta, S; Hwu, W; Lu, F
44254	discussion-recitation	AD4	09:00 AM - 09:50 AM	F	room 257 Everitt Elec and Comp Engr Lab	Lumetta, S; Hwu, W; Obeid, N
44255	discussion-recitation	AD5	12:00 PM - 12:50 PM	F	room 165 Everitt Elec and Comp Engr Lab	Lumetta, S; Hwu, W; Lu, F
50303	discussion-recitation	AD6	09:00 AM - 09:50 AM	F	room 170 Everitt Elec and Comp Engr Lab	Lumetta, S; Hwu, W; Truty, W
50304	discussion-recitation	AD7	12:00 PM - 12:50 PM	F	room 241 Everitt Elec and Comp Engr Lab	Lumetta, S; Hwu, W; Truty, W
52879	discussion-recitation	AD8	02:00 PM - 02:50 PM	F	room 170 Everitt Elec and Comp Engr Lab	Lumetta, S; Hwu, W; Ramasubramanian, B
44236	lecture-discussion	AE1	11:00 AM - 12:20 PM	TR	room 165 Everitt Elec and Comp Engr Lab	Lumetta, S
51704	lecture-discussion	AE2	02:00 PM - 03:20 PM	TR	room 151 Everitt Elec and Comp Engr Lab	Hwu, W

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
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29836	lecture	SH	05:00 PM - 06:50 PM	W	room 151 Everitt Elec and Comp Engr Lab	Kudeki, E
29836: 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
31717	lecture	A	09:00 AM - 10:20 AM	TR	room 103 Talbot Laboratory	Zhang, J
31720	lecture	F	02:00 PM - 03:20 PM	TR	room 103 Transportation Bldg	Choi, H

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
36694	laboratory	F1	08:00 AM - 09:50 AM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Niehaus, L
36836	laboratory	F10	06:00 PM - 07:50 PM	W	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Lu, M
36834	laboratory	F11	06:00 PM - 07:50 PM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Musick, K
36831	laboratory	F2	10:00 AM - 11:50 AM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Umeki, R
36830	laboratory	F3	12:00 PM - 01:50 PM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J
36828	laboratory	F4	08:00 AM - 09:50 AM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Niehaus, L
36827	laboratory	F5	10:00 AM - 11:50 AM	R	room 268 Everitt	Zhang, J; Esteki, D

			AM		Elec and Comp Engr Lab	
36825	laboratory	F6	10:00 AM - 11:50 AM	W	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Esteki, D
36824	laboratory	F7	01:00 PM - 02:50 PM	W	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Umeki, R
36820	laboratory	F9	06:00 PM - 07:50 PM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Lee, B

**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
36863	laboratory	AB1	10:00 AM - 11:50 AM	M	room 234 Everitt Elec and Comp Engr Lab	Comberiate, T; Reyes, P
36891	laboratory	AB2	10:00 AM - 11:50 AM	M	room 234 Everitt Elec and Comp Engr Lab	Comberiate, T; Reyes, P
36867	laboratory	AB3	12:00 PM - 01:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Comberiate, T; Reyes, P
36874	laboratory	AB4	12:00 PM - 01:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Comberiate, T; Reyes, P
36875	laboratory	AB5	02:00 PM - 03:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Comberiate, T; Reyes, P
36881	laboratory	AB6	02:00 PM - 03:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Comberiate, T; Reyes, P
36878	laboratory	AB7	04:00 PM - 05:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Comberiate, T; Reyes, P
36888	laboratory	AB8	04:00 PM - 05:50 PM	M	room 234 Everitt Elec and Comp Engr Lab	Comberiate, T; Reyes, P

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	Comberiate, T; Reyes, P
36709	laboratory	ABA	06:00 PM - 07:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Comberiate, T; Reyes, P
36717	laboratory	ABB	06:00 PM - 07:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Comberiate, T; Reyes, P
36696	lecture	AL1	09:00 AM - 09:50 AM	MTWTF	room 218 Ceramics Bldg	Trick, T; Millard, A; Blackburn, J
36702	lecture	AL2	10:00 AM - 10:50 AM	MTWTF	room 269 Everitt Elec and Comp Engr Lab	Basar, T; Millard, A; Blackburn, J
36706	lecture	AL3	01:00 PM - 01:50 PM	MTWTF	room 269 Everitt Elec and Comp Engr Lab	Franke, P; Millard, A; Blackburn, J

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
31722	lecture	B	09:00 AM - 09:50 AM	MTWTF	room 218 Ceramics Bldg	Trick, T
31722: Meets 25-Aug-08 - 18-Oct-08.						
31723	lecture	C	10:00 AM - 10:50 AM	MTWTF	room 269 Everitt Elec and Comp Engr Lab	Basar, T
31723: Meets 25-Aug-08 - 18-Oct-08.						
31725	lecture	E	01:00 PM - 01:50 PM	MTWTF	room 269 Everitt Elec and Comp Engr Lab	Franke, P
31725: Meets 25-Aug-08 - 18-Oct-08.						

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: Credit or concurrent registration in 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 257 Everitt Elec and Comp Engr Lab	Brown, D; Liu, Y
36925	discussion-recitation	AD3	10:00 AM - 10:50 AM	R	room 257 Everitt Elec and Comp Engr Lab	Brown, D; Sloan, J
36922	discussion-recitation	AD4	11:00 AM - 11:50 AM	R	room 257 Everitt Elec and Comp Engr Lab	Brown, D; Sloan, J
36919	discussion-recitation	AD5	12:00 PM - 12:50 PM	R	room 257 Everitt Elec and Comp Engr Lab	Brown, D; Juen, J
36917	discussion-recitation	AD6	01:00 PM - 01:50 PM	R	room 257 Everitt Elec and Comp Engr Lab	Brown, D; Juen, J
36914	discussion-recitation	AD7	02:00 PM - 02:50 PM	R	room 257 Everitt Elec and Comp Engr Lab	Brown, D; Baillio, B
36895	discussion-recitation	AD8	03:00 PM - 03:50 PM	R	room 257 Everitt Elec and Comp Engr Lab	Brown, D; Baillio, B
36719	lecture	AL1	09:00 AM - 09:50 AM	MW	room 1320 Digital Computer Laboratory	Brown, D

297 **Individual Study** credit: 1 hours.

Individual projects. Approved written application to department as specified by department or instructors is required. Approved for both letter and S/U grading. May be repeated in separate terms to a maximum of 2 hours.

Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
52241	independent study		ARRANGED			
52241: 1 hours						
53020	independent study	EP	ARRANGED			Pop, E
53020: 1 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
49975	discussion-recitation	C	10:00 AM - 10:50 AM	MWF	room 1109 Siebel Center for Comp Sci	Sarwate, D
49975: 3 hours						
49976	discussion-recitation	D	11:00 AM - 11:50 AM	MWF	room 1105 Siebel Center for Comp Sci	Milenkovic, O
49976: 3 hours						
52208	discussion-recitation	E	01:00 PM - 01:50 PM	MWF	room 1302 Siebel Center for Comp Sci	Sarwate, D
52208: 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
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	11:00 AM - 12:20 PM	TR	room 329 Gregory Hall	Hillmer, P
36869: Advanced Composition, and Hist&Philosoph Perspect course.						

317 **ECE Technology & 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 Computer or Electrical Engineering

majors. Prerequisite: One of MATH 220, MATH 221, MATH 234.

CRN	Type	Section	Time	Days	Location	Instructor
29838	lecture	G	03:30 PM - 04:50 PM	MW	room 260 Everitt Elec and Comp Engr Lab	Peck, T
29838: Departmental Approval Required						
29838: This course is restricted to students in the Technology and Management program.						

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
31726	discussion-recitation	A	08:00 AM - 08:50 AM	MWF	room 260 Everitt Elec and Comp Engr Lab	Oelze, M
31727	discussion-recitation	C	10:00 AM - 10:50 AM	MWF	room 241 Everitt Elec and Comp Engr Lab	Kim, K
31729	discussion-recitation	E	01:00 PM - 01:50 PM	MWF	room 245 Everitt Elec and Comp Engr Lab	Kudeki, E
31732	discussion-recitation	X	12:00 PM - 12:50 PM	MWF	room 269 Everitt Elec and Comp Engr Lab	Waldrop, L

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	Kesler, D
36856	laboratory	AB2	03:00 PM - 05:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Haus, J

36821	laboratory	AB3	03:00 PM - 05:50 PM	R	room 234 Everitt Elec and Comp Engr Lab	Han, K
36826	laboratory	AB5	11:30 AM - 02:20 PM	R	room 234 Everitt Elec and Comp Engr Lab	Bray, N
36835	laboratory	AB6	12:00 PM - 02:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Kesler, D
36829	laboratory	AB7	03:00 PM - 05:50 PM	W	room 234 Everitt Elec and Comp Engr Lab	Goh, P
36838	laboratory	AB8	03:00 PM - 05:50 PM	R	room 234 Everitt Elec and Comp Engr Lab	Goh, P
36728	laboratory	ABA	11:30 AM - 02:20 PM	R	room 234 Everitt Elec and Comp Engr Lab	Kartan, S
36737	laboratory	ABB	03:00 PM - 05:50 PM	T	room 234 Everitt Elec and Comp Engr Lab	Han, K
36773	laboratory	ABC	03:00 PM - 05:50 PM	T	room 234 Everitt Elec and Comp Engr Lab	Haus, J
36805	laboratory	ABE	11:30 AM - 02:20 PM	T	room 234 Everitt Elec and Comp Engr Lab	Kartan, S
36806	laboratory	ABF	11:30 AM - 02:20 PM	T	room 234 Everitt Elec and Comp Engr Lab	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. Credit is not given for both ECE 391 and CS 241. Prerequisite: ECE 290 or CS 231.

CRN	Type	Section	Time	Days	Location	Instructor
50239	discussion-recitation	AD1	02:00 PM - 02:50 PM	T	room 257 Everitt Elec and Comp Engr Lab	Frank, M; Koehn, T

50240	discussion-recitation	AD2	11:00 AM - 11:50 AM	W	room 257 Everitt Elec and Comp Engr Lab	Frank, M; Co, C
50241	discussion-recitation	AD3	01:00 PM - 01:50 PM	W	room 241 Everitt Elec and Comp Engr Lab	Frank, M; Weaver, N
47765	lecture	AL	10:30 AM - 11:45 AM	TR	room 106B8 Engineering Hall	Frank, M

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
29852	laboratory	A	ARRANGED			Haken, L
	lecture	A	04:00 PM - 04:50 PM	T	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: 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
52236	lecture	KC	10:00 AM - 10:50 AM	MWF	room 445 Altgeld Hall	Choquette, K
<p>52236: 3 hours Topic: Electronic &amp; Photonic Devices. Prerequisites: Phys 214; and credit or concurrent registration in ECE 329. For ECE students, this course will count toward graduation for the ECE 440 requirement. A first course on semiconductor devices for sophomores and juniors in electrical engineering. The cellular phone and its associated information distribution systems are used to introduce and motivate the study of electronic and photonic devices. Following this introduction, the core concepts of all semiconductor devices # semiconductor carriers, energy bands, and the pn junction diode # will be studied in detail including web-based virtual laboratories. Armed with a solid understanding of the energy band structure and electrical characteristics of the diode, a student can understand the structure and operation of many semiconductor devices important to technologies of the information age. Devices to be examined will include metal-oxide-semiconductor field effect transistors, bipolar transistors, solar cells, light emitting diodes, laser diodes, and photodetectors.</p>						
52283	lecture	NC	09:00 AM - 09:50 AM	MWF	room 204 Transportation Bldg	Cheng, K
<p>52283: 3 hours Topic: Introduction to Semiconductor and Devices. Prerequisites: Phys 214. This introductory course on semiconductor devices is designed for sophomores in ECE department. This course divided into four major parts: The semiconductor fundamentals are introduced first such that carrier distributions and transportation concepts are clearly established. In the second part, devices utilizing a single type of carriers will be discussed along with their circuit models, biasing schemes, and circuit applications. The bipolar devices, where two types of carrier # electron and hole # are utilized at the same time, will be discussed in the third part of the course. Finally, photonic devices, where photons are involved in addition to electrons and holes, will be introduced. The course is design at a level such that ECE329 is not required but provides a solid foundation for other core courses including ECE441 and ECE442. The credit of this course can be counted toward ECE440.</p>						

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, ECE 290, and ECE 410.

CRN	Type	Section	Time	Days	Location	Instructor
29932	discussion-recitation	L	08:00 AM - 09:20 AM	TR	room 260 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.

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	Jones, D
	lecture	E	01:00 PM - 01:50 PM	M	room 165 Everitt Elec and Comp Engr Lab	Jones, D
50306	lecture	G	03:00 PM - 04:20 PM	WF	room 1310 Digital Computer Laboratory	Bresler, Y
	lecture	G	03:00 PM - 03:50 PM	M	room 1310 Digital Computer Laboratory	Bresler, Y
: 4 hours						

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

Basic computer organization and design: integer and floating-point computer arithmetic, control unit design, pipelining, system interconnect, memory organization, I/O design, 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 391 or CS 241.

Students must register for one lab and one discussion section.

CRN	Type	Section	Time	Days	Location	Instructor
29937	laboratory	AB1	ARRANGED			Polychronopoulos, C
29942	discussion-recitation	AD1	03:00 PM - 04:20 PM	MW	room 106B1 Engineering Hall	Polychronopoulos, C

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

Same as BIOE 414. See BIOE 414.

CRN	Type	Section	Time	Days	Location	Instructor
39237	lecture	B	11:00 AM - 11:50 AM	MWF	room 103 Transportation Bldg	Gentry, K

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

Same as BIOE 415. See ECE 415.

CRN	Type	Section	Time	Days	Location	Instructor
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39239	laboratory	AB1	01:00 PM - 03:50 PM	T	room ARR Digital Computer Laboratory	Gentry, K
39239: This lab meets in 3107 DCL.						
39240	laboratory	AB2	01:00 PM - 03:50 PM	F	room ARR Digital Computer Laboratory	Gentry, K
39240: This lab meets in 3107 DCL.						
39241	laboratory	AB3	01:00 PM - 03:50 PM	M	room ARR Digital Computer Laboratory	Gentry, K
39241: This lab meets in 3107 DCL.						
39242	laboratory	AB4	01:00 PM - 03:50 PM	W	room ARR Digital Computer Laboratory	Gentry, K
39242: This lab meets in 3107 DCL.						
39238	lecture	AL1	12:00 PM - 12:50 PM	W	room 243 Mechanical Engineering Bldg	Gentry, K

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	02:30 PM - 04:20 PM	T	room 251 Everitt Elec and Comp Engr Lab	Jun, D; Allen, J; Brady, S
31826	laboratory	AB2	02:00 PM - 03:50 PM	W	room 251 Everitt Elec and Comp Engr Lab	Jun, D; Allen, J; Brady, S
31840	lecture	AL1	02:00 PM - 02:50 PM	M	room 165 Everitt Elec and Comp Engr Lab	Allen, J

422 **Computer Security I** credit: 3 or 4 hours.

Same as CS 461. See CS 461.

CRN	Type	Section	Time	Days	Location	Instructor
49548	lecture	A3	11:00 AM - 11:50	MWF	room 1310 Digital	Hinrichs, S

			AM		Computer Laboratory	
49548: 3 hours						
49549	lecture	A4	11:00 AM - 11:50 AM	MWF	room 1310 Digital Computer Laboratory	Hinrichs, S
49549: 4 hours						

424 **Computer Security II** credit: 3 or 4 hours.  
Same as CS 463. See CS 463.

CRN	Type	Section	Time	Days	Location	Instructor
49552	lecture	B3	02:00 PM - 03:15 PM	TR	room 1103 Siebel Center for Comp Sci	Hu, Y
49552: 3 hours						
49553	lecture	B4	02:00 PM - 03:15 PM	TR	room 1103 Siebel Center for Comp Sci	Hu, Y
49553: 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
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
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36102	lecture-discussion	P	02:00 PM - 03:15 PM	TR	room 1105 Siebel Center for Comp Sci	Nahrstedt, K
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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
31846	discussion-recitation	C	10:00 AM - 10:50 AM	MWF	room 106B8 Engineering Hall	Sauer, P
31849	discussion-recitation	N	09:30 AM - 10:50 AM	TR	room 252 Mechanical Engineering Bldg	Dominguez-Garcia, A

437 **Sensors and Instrumentation** credit: 3 hours.

Gives a hands-on introduction to the fundamental technology and practical application of sensors. Capacitive, inductive, optical, electromagnetic, and other sensing methods are examined. Instrumentation techniques incorporating computer control, sampling, and data collection and analysis are reviewed in the context of real-world scenarios. Prerequisite: ECE 329.

CRN	Type	Section	Time	Days	Location	Instructor
49832	laboratory	AB1	02:00 PM - 04:50 PM	W	room 235 Everitt Elec and Comp Engr Lab	Bernhard, J; Pepich, M
49833	laboratory	AB2	09:00 AM - 11:50 AM	F	room 235 Everitt Elec and Comp Engr Lab	Bernhard, J; Pepich, M
49834	laboratory	AB3	02:00 PM - 04:50 PM	F	room 235 Everitt Elec and Comp Engr Lab	Bernhard, J; Pepich, M
49831	lecture	AL	03:00 PM - 04:20 PM	T	room 260 Everitt Elec and Comp Engr Lab	Bernhard, J

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

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

CRN	Type	Section	Time	Days	Location	Instructor
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36066	lecture-discussion	X	02:00 PM - 02:50 PM	MWF	room 106B1 Engineering Hall	Vaidya, 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 and Computer 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	Feng, M
36939	discussion-recitation	E	01:00 PM - 01:50 PM	MWF	room 163 Everitt Elec and Comp Engr Lab	Pop, E
36944	discussion-recitation	G	03:00 PM - 03:50 PM	MWF	room 245 Everitt Elec and Comp Engr Lab	Tucker, J
36937	discussion-recitation	X	12:00 PM - 12:50 PM	MWF	room 163 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 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
29950	lecture	D	11:00 AM - 11:50 AM	MWF	room 269 Everitt Elec and Comp Engr Lab	Chiu, Y

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
31856	laboratory	M	09:00 AM - 11:50	T	room 268 Everitt	Zhang, J; Asok

			AM		Elec and Comp Engr Lab	Kumar, J
31857	laboratory	N	12:00 PM - 02:50 PM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Bambery, R
31859	laboratory	O	03:00 PM - 05:50 PM	T	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Kang, Y
31862	laboratory	P	12:00 PM - 02:50 PM	R	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Bambery, R
31864	laboratory	Q	03:00 PM - 05:50 PM	M	room 268 Everitt Elec and Comp Engr Lab	Zhang, J; Kang, Y

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; Lee, E
36809	laboratory	AB2	08:00 AM - 10:50 AM	T	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Raj, A
36819	laboratory	AB3	12:00 PM - 02:50 PM	T	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Wayne, M
36817	laboratory	AB4	02:00 PM - 04:50 PM	W	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Ou, W
36816	laboratory	AB5	09:00 AM - 11:50 AM	R	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Raj, A
36814	laboratory	AB6	02:00 PM - 04:50 PM	M	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Wahby, W
41682	laboratory	AB7	02:00 PM - 04:50 PM	R	room 50M Everitt Elec and Comp Engr Lab	Sievers, D; Dowdy, R
36813	discussion-recitation	AD1	09:00 AM - 09:50 AM	MWF	room 245 Everitt Elec and Comp	Li, X

					Engr Lab	
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 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
29951	laboratory	H	04:00 PM - 04:50 PM	W	room 253 Mechanical Engineering Bldg	Swenson, G

448 **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	Dejong, G
36055: 3 hours						
36059	lecture-discussion	Q4	12:30 PM - 01:45 PM	TR	room 1404 Siebel Center for Comp Sci	Dejong, G
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 and Computer 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	Cangellaris, A
31868	discussion-	X	12:00 PM - 12:50	MWF	room 245 Everitt	Liu, G

	recitation		PM		Elec and Comp Engr Lab	
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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; Milosevic, P
31874	laboratory	AB2	02:00 PM - 04:50 PM	T	room 249 Everitt Elec and Comp Engr Lab	Schutt-Aine, J; Milosevic, P
31878	laboratory	AB3	01:00 PM - 03:50 PM	R	room 249 Everitt Elec and Comp Engr Lab	Schutt-Aine, J; Klokotov, D
31881	laboratory	AB4	08:00 AM - 10:50 AM	R	room 249 Everitt Elec and Comp Engr Lab	Schutt-Aine, J; Klokotov, D
31885	lecture	AL1	12:00 PM - 12:50 PM	MWF	room 260 Everitt Elec and Comp Engr Lab	Schutt-Aine, J

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	09:30 AM - 10:50 AM	TR	room 241 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; Minin, S

39245	laboratory	AB2	03:00 PM - 05:50 PM	T	room 251 Everitt Elec and Comp Engr Lab	Franke, S; Minin, S
39246	laboratory	AB3	09:00 AM - 11:50 AM	R	room 251 Everitt Elec and Comp Engr Lab	Franke, S; Jayaraman, 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.

CRN	Type	Section	Time	Days	Location	Instructor
29956	lecture	G4	01:00 PM - 02:20 PM	MW	room 1109 Siebel Center for Comp Sci	Eden, J
29956: 4 hours						
43395	lecture	UG3	01:00 PM - 02:20 PM	MW	room 1109 Siebel Center for Comp Sci	Eden, J
43395: 3 hours						

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

Focuses on the analog underpinning of analog and digital communication systems: representation of signals and systems in the time and frequency domains; analog modulation schemes; random processes; prediction and noise analysis using random processes; noise sensitivity and bandwidth requirements of modulation schemes; and a brief introduction to digital communications. Prerequisite: ECE 313.

CRN	Type	Section	Time	Days	Location	Instructor
29959	lecture-discussion	R	01:30 PM - 02:50 PM	TR	room 305 Materials Science and Eng Bld	Schmitz, C

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 313 or STAT 400.

CRN	Type	Section	Time	Days	Location	Instructor
39248	laboratory	AB1	ARRANGED		room 50H Everitt Elec and Comp Engr Lab	Popescu, G
39249	laboratory	AB2	ARRANGED		room 50H Everitt Elec and Comp Engr Lab	Popescu, G
39250	laboratory	AB3	ARRANGED		room 50H Everitt Elec and Comp Engr Lab	Popescu, G
39247	lecture	AL1	02:00 PM - 02:50 PM	TR	room 241 Everitt Elec and Comp Engr Lab	Popescu, G

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 101 Transportation Bldg	Chapman, P

465 **Optical Communications Systems** credit: 3 hours.

Fundamentals of lightwave systems: characterization of lightwave channels, optical transmitters, receivers, and amplifiers; quantum and thermal noise processes; design of optical receivers; multimode and single-mode link analysis. Prerequisite: ECE 313 and ECE 450. Recommended: credit or concurrent registration in ECE 459 and ECE 466.

CRN	Type	Section	Time	Days	Location	Instructor
45178	lecture	A	10:00 AM - 11:15 AM	TR	room 344 Mechanical Engineering Bldg	Singer, A

466 **Optical Communications Lab** credit: 1 hours.

Laboratory course in optical communication systems: fiber components and measurements, transmitters and detectors, fiber amplifiers, multimode fiber links, and wavelength division multiplexing. Prerequisite: Credit or concurrent registration in ECE 465.

CRN	Type	Section	Time	Days	Location	Instructor
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45389	laboratory	AB1	ARRANGED			Singer, A; Dragic, P
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467 **Biophotonics** credit: 3 hours.

An overview of the field of biophotonics, divided into three segments: (1) fundamental principles of light, optics, lasers, biology, and medicine; (2) diagnostic biophotonics including imaging, spectroscopy, and optical biosensors; (3) therapeutic applications of biophotonics including laser ablation and photodynamic therapies. Includes student review and presentation of current scientific literature and tours of microscopy facilities. Same as BIOE 467.

Prerequisite: One of ECE 455, ECE 460, PHYS 402.

CRN	Type	Section	Time	Days	Location	Instructor
51217	lecture	A	09:30 AM - 10:50 AM	TR	room 245 Everitt Elec and Comp Engr Lab	Boppart, S
51217: 3 hours						

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; credit or concurrent registration in ECE 464.

CRN	Type	Section	Time	Days	Location	Instructor
31888	laboratory	AB1	09:30 AM - 12:20 PM	T	room 50 Everitt Elec and Comp Engr Lab	Chapman, P; Friedl, A
31891	laboratory	AB2	12:00 PM - 02:50 PM	W	room 50 Everitt Elec and Comp Engr Lab	Chapman, P; Wiczkowski, P
31893	lecture	AL1	12:00 PM - 12:50 PM	M	room 241 Everitt Elec and Comp Engr Lab	Chapman, 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.

CRN	Type	Section	Time	Days	Location	Instructor
36913	laboratory	AB1	01:00 PM - 02:50 PM	T	room 267 Everitt Elec and Comp Engr Lab	Hutchinson, S; Candido, S

36943	laboratory	AB2	01:00 PM - 02:50 PM	R	room 267 Everitt Elec and Comp Engr Lab	Hutchinson, S; Gregg, R
41536	laboratory	AB3	03:00 PM - 04:50 PM	T	room 267 Everitt Elec and Comp Engr Lab	Hutchinson, S; Candido, S
36956	lecture	AL1	11:30 AM - 12:50 PM	TR	room 106B1 Engineering Hall	Hutchinson, S

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
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	12:30 PM - 01:50 PM	TR	room 165 Everitt Elec and Comp Engr Lab	Overbye, T

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. Prerequisite: Recommended: ECE 410.

CRN	Type	Section	Time	Days	Location	Instructor
45265	lecture	S	02:00 PM - 03:20 PM	TR	room 245 Everitt Elec and Comp Engr Lab	Liang, Z

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 241 Everitt Elec and Comp Engr Lab	Shanbhag, N

485 **MEMS Devices & Systems** credit: 3 hours.

Presents an introduction to the principles, fabrication techniques, and applications of microelectromechanical systems (MEMS). Gives 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. For engineering majors with senior standing.

CRN	Type	Section	Time	Days	Location	Instructor
36987	lecture	C	10:00 AM - 11:20 AM	TR	room 163 Noyes Laboratory	Cunningham, B
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.

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	Sundaram, S; Gostin, A
31777	laboratory	AB2	03:00 PM - 05:50 PM	T	room 235 Everitt Elec and Comp Engr Lab	Sundaram, S; Gostin, A
31778	laboratory	AB3	08:00 AM - 10:50 AM	R	room 235 Everitt Elec and Comp Engr Lab	Vladimerou, V; Sundaram, S
31772	discussion-recitation	AD1	10:00 AM - 10:50 AM	MWF	room 4101 Materials Science and Eng Bld	Sundaram, S

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
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. 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
47638	laboratory	AB4	02:30 PM - 04:50 PM	W	room 251 Everitt Elec and Comp Engr Lab	Yao, D; Makela, J
51611	laboratory	AB5	02:30 PM - 04:50 PM	F	room 251 Everitt Elec and Comp Engr Lab	Yao, D; Makela, J
47432	lecture	AL	10:00 AM - 10:50	MWF	room 257 Everitt	Makela, J

			AM		Elec and Comp Engr Lab	
47432: 3 hoursTopic: Global Positioning Systems. Prerequisites: ECE 329. An introduction to global navigation satellite systems, with a focus on the global positioning system (GPS). The European Galileo system and the Russian GLONASS system will also be discussed, as will the modernization of the current U.S. GPS. Topics to be covered in lectures and laboratories include basics of navigation, mathematics of obtaining a navigation solution, receiver design and analysis, error analysis and error mitigation.						
52550	lecture	LEE	05:00 PM - 06:15 PM	T	room 1404 Siebel Center for Comp Sci	Hollis, L; Singer, A
52550: 1 hoursTopic: Advanced Lectures in Engineering Entrepreneurship. Prerequisite: Junior, Senior or Graduate student. Analysis of concepts of entrepreneurship and commercialization of new technology in new and existing businesses. Guest speaker topics vary, but typically include: idea validation and opportunity assessment; commercializing new technologies; venture funding; legal issues; product development; marketing; international business issues. Critical analysis of case studies in high-technology ventures with specific emphasis on ventures based on technologies in electrical and computer engineering.						
51561	lecture	LG	11:00 AM - 11:50 AM	MWF	room 106B8 Engineering Hall	Goddard, L
51561: 3 hoursTopic: Princip of Experimental Research. Prerequisites: ECE 313 and Senior or Graduate standing in an engineering or science curriculum, or by permission of the instructor. This is an interdisciplinary course designed for first year graduate students and advanced undergraduates. The course focuses on: (1) design of experiments, (2) prevalent experimental techniques, (3) data organization, analysis, and presentation techniques, and (4) scientific computing languages and software. Students will carry out two experiments of their own design demonstrating automated data collection and screening of variables. They will also present scientific material in three common formats: at a poster session, at a conference talk, and in a journal paper. The main course objective is for students to develop the basic skills needed for pursuing a career or an advanced degree involving experimental research.						
51703	lecture	SL	11:00 AM - 11:50 AM	MW	room 241 Everitt Elec and Comp Engr Lab	Shanbhag, N
51703: 3 hoursTopic: System-on-ashcip (DOC) Desgin Laboratory. Prerequisites: Concurrent registration in 482/483/425. The proposed course will introduce our students to the practical issues in the design of complex systems-on-a-chip (SOC) through a hands-on design of an SOC. One of the instructors (Jonathan Ashbrook) is from industry (Finisar Corporation, Champaign) and has extensive experience with methodology and industry quality IC design. Jonathan will set-up the tool-flow necessary for executing the course projects. This is a project-oriented course to complement our existing circuit design courses (482, 483 and 435) and include all the design (system, architectures, logic, circuit, layout, verification, tape-out procedures), project management (specifications, design documentation, design reviews) steps, and require students to work together in groups of 4-5 each. A modern SOC will be designed starting from system specifications all the way down to a tape-out ready IC database. The course will benefit our undergraduates by preparing them to participate in IC design projects in industry or in graduate school and our graduate students by providing them with skills necessary to design ICs as part of their graduate research program.						

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 **ECE Colloquium** credit: 0 hours.  
 Required of all graduate students. Approved for S/U grading only.

CRN	Type	Section	Time	Days	Location	Instructor
29981	lecture	U	04:00 PM - 04:50 PM	R	room 151 Everitt Elec and Comp Engr Lab	Gross, G
41517	lecture	U2	04:00 PM - 04:50 PM	R	room 151 Everitt Elec and Comp Engr Lab	Gross, G
41518	lecture	U3	04:00 PM - 04:50 PM	R	room 151 Everitt Elec and Comp Engr Lab	Gross, G

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.

CRN	Type	Section	Time	Days	Location	Instructor
37011	discussion-recitation	F	02:00 PM - 03:20 PM	MW	room 1302 Siebel Center for Comp Sci	Kumar, R

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
29983	discussion-recitation	N	09:30 AM - 10:50 AM	TR	room 106B1 Engineering Hall	Liberzon, D

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	01:00 PM - 02:20 PM	MW	room 170 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	03:00 PM - 04:20 PM	TR	room 241 Everitt Elec and Comp Engr Lab	Jin, J

527 **System-On-Chip Design** credit: 4 hours.

Covers system-on-chip (SOC) design methodology and IP (intellectual property) reuse, system modeling and analysis, hardware/software co-design, behavioral synthesis, embedded software, reconfigurable computing, design verification and test, and design space exploration. Focusing on current SOC design and research topics, students are given opportunities to carry out class projects based on their own interests. Platform FPGA boards and digital cameras are provided to students to prototype, test, and evaluate their SOC designs. Prerequisite: ECE 391 and ECE 425.

CRN	Type	Section	Time	Days	Location	Instructor
52442	lecture	C	11:00 AM - 12:20 PM	TR	room 309 English Bldg	Chen, D
52442: 4 hours						

530 **Large-Scale System Analysis** credit: 4 hours.

Fundamental techniques for the analysis of large-scale electrical systems, including methods for nonlinear and switched systems. The importance of the structural characteristics of such systems is stressed. Key aspects of static and dynamic analysis methods are presented. Prerequisite: ECE 464 and ECE 476.

CRN	Type	Section	Time	Days	Location	Instructor
50992	lecture	A	11:00 AM - 12:20	TR	room 241 Everitt	Gross, G

			PM		Elec and Comp Engr Lab	
50992: 4 hours						

532 **Compnd Semicond & 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 260 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 313, MATH 461, STAT 400.

CRN	Type	Section	Time	Days	Location	Instructor
29989	discussion- recitation	C	08:00 AM - 09:50 AM	F	room 269 Everitt Elec and Comp Engr Lab	Hajek, B
	discussion- recitation	C	08:00 AM - 08:50 AM	W	room 269 Everitt Elec and Comp Engr Lab	Hajek, B

535 **Theory of Semicond & Devices** credit: 4 hours.

Introductory quantum mechanics of semiconductors; energy bands; dynamics of Block 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 153 Mechanical Engineering Bldg	Leburton, J

537 **Speech Processing Fundamentals** credit: 4 hours.

Provides an intuitive understanding of speech processing by the auditory system, in three parts. I: The theory of

acoustics of speech production, introductory acoustic phonetics, inhomogeneous transmission line theory (and reflectance), room acoustics, the short-time Fourier Transform (and its inverse), and signal processing of speech (LPC/CELP/VQ). II: Psychoacoustics of speech perception, critical bands, masking (JNDs), and the physiology of the auditory pathway (cochlear modeling). III: Information theory entropy, channel capacity, the confusion matrix, state models, EM algorithms, and Bayesian networks. Classic papers on speech processing and speech perception assigned and presented by student groups. Matlab (or equivalent) programming is required for many of the homeworks. Prerequisite: ECE 410.

CRN	Type	Section	Time	Days	Location	Instructor
29993	lecture	E	01:00 PM - 01:50 PM	MWF	room 214 Ceramics Bldg	Allen, J

538 **Speech and Hearing Acoustics** credit: 4 hours.

Fundamentals of acoustics: resonance, standing waves, frequency response, Fourier analysis, acoustic impedance, transients, and room response. Source-filter theory of speech production, glottal source, and multi-tube filter models. Auditory and speech physiology, psychoacoustics (pitch, loudness, masking, articulation index), and auditory prostheses (hearing aids, cochlear implants). Same as LING 521 and SHS 503. Credit is not given for both ECE 538 and ECE 537. Credit is not given to graduate engineering majors. Prerequisite: One of LING 303, LING 401, SHS 301.

CRN	Type	Section	Time	Days	Location	Instructor
52523	laboratory	AB1	07:00 PM - 08:50 PM	M	room 112 Speech and Hearing Clinic	Husain, F
52523: The lab for this course will be held in 1420 Beckman Institute.						
52443	lecture	AL1	01:00 PM - 03:50 PM	M	room 137 Armory	Husain, F

540 **Computational Electromagnetics** credit: 4 hours.

Course will cover basic computational techniques for numerical analysis of electromagnetics problems, including the finite difference, finite element, and moment methods. Emphasis will be placed on the formulation of physical problems into mathematical boundary-value problems, numerical discretization of continuous problems into discrete problems, and development of rudimentary computer codes for simulation of electromagnetic fields in engineering problems using each of these techniques. Same as CSE 530. Prerequisite: CS 357; credit or concurrent registration in ECE 520.

CRN	Type	Section	Time	Days	Location	Instructor
39251	lecture- discussion	R	12:30 PM - 01:50 PM	TR	room 241 Everitt Elec and Comp Engr Lab	Jin, J
39251: 4 hours						

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: One of ECE 313, MATH 461, MATH 463.

CRN	Type	Section	Time	Days	Location	Instructor
35928	lecture-discussion	B	09:30 AM - 10:45 AM	TR	room 1304 Siebel Center for Comp Sci	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. Credit towards a degree from multiple offerings of this course is not given if those offerings have significant overlap, as determined by the ECE department. Prerequisite: As specified each term. It is expected that each offering will have a 500-level course as prerequisite or co-requisite.

CRN	Type	Section	Time	Days	Location	Instructor
49835	lecture	NA	11:30 AM - 12:50 PM	TR	room 163 Everitt Elec and Comp Engr Lab	Ahuja, N
49835: 4 hours Topic: 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.						
47953	lecture	PM	10:00 AM - 11:20 AM	MW	room 170 Everitt Elec and Comp Engr Lab	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.

CRN	Type	Section	Time	Days	Location	Instructor
40637	lecture-discussion	A	01:00 PM - 01:50 PM	MWF	room 257 Everitt Elec and Comp Engr Lab	O'Brien, W

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 313 and ECE 410.

CRN	Type	Section	Time	Days	Location	Instructor
37129	discussion-recitation	O	11:30 AM - 12:50 PM	TR	room 305 Materials Science and Eng Bld	Huang, T

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 313 and ECE 410.

CRN	Type	Section	Time	Days	Location	Instructor
37133	discussion-recitation	F	03:00 PM - 03:50 PM	R	room 135 Mechanical Engineering Bldg	Hasegawa-Johnson, M
	discussion-recitation	F	03:00 PM - 04:50 PM	T	room 135 Mechanical Engineering Bldg	Hasegawa-Johnson, M

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

555 **Control of Stochastic Systems** credit: 4 hours.

Stochastic control models; development of control laws by dynamic programming; separation of estimation and control; Kalman filtering; self-tuning regulators; dual controllers; decentralized control. Prerequisite: ECE 515 and ECE 534.

CRN	Type	Section	Time	Days	Location	Instructor
43280	lecture	C	11:30 AM - 12:50 PM	WF	room 170 Everitt Elec and Comp Engr Lab	Meyn, S

**562 Advanced Digital Communication** credit: 4 hours.

An in-depth treatment of digital communication systems modulation, demodulation, signal space methods, channel models, bit error rate, spectral occupancy, synchronization, equalization, trellis-coded modulation, wireless channels, multiantenna systems, spread spectrum, and orthogonal frequency modulation. ECE 361 or ECE 459.

CRN	Type	Section	Time	Days	Location	Instructor
52327	lecture	A	11:00 AM - 12:20 PM	TR	room 245 Everitt Elec and Comp Engr Lab	Viswanath, P
52327: 4 hours						

**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: One of ECE 534, MATH 464, MATH 564.

CRN	Type	Section	Time	Days	Location	Instructor
37140	discussion- recitation	A	08:00 AM - 09:50 AM	M	room 163 Everitt Elec and Comp Engr Lab	Coleman, T
	discussion- recitation	A	09:00 AM - 09:50 AM	W	room 163 Everitt Elec and Comp Engr Lab	Coleman, T

**583 Semiconductor Nanotech Lab** credit: 4 hours.

A lab course treating the practical aspects of design and testing of nanometer-scale, MOS circuit technology. Emphasis on process integration and the interrelationship between the process flow and device/circuit performance. Experience with state-of-the-art, process and device simulation tools; nanostructure characterization using atomic force and transmission electron microscopies; and capacitance, conductance and scattering parameter measurements used to extract parameters for circuit models. Prerequisite: ECE 444; PHYS 485 or PHYS 486.

CRN	Type	Section	Time	Days	Location	Instructor
49973	lecture	C	11:00 AM - 12:20 PM	TR	room 260 Everitt Elec and Comp Engr Lab	Timp, G
49973: 4 hours						

**586 Topics in Decision and Control** credit: 4 hours.

Lectures and discussions related to advanced topics and new areas of interest in decision and control theory, including hybrid, sampled-data, and fault tolerant systems, control over networks, vision-based control, system

estimation and identification, and dynamic games. May be repeated up to 12 hours within a term, and up to 20 hours total for the course. Credit towards a degree from multiple offerings of this course is not given if those offerings have significant overlap, as determined by the ECE department. Prerequisite: As specified each term. It is expected that each offering will have a 500-level course as prerequisite or co-requisite.

CRN	Type	Section	Time	Days	Location	Instructor
51292	lecture	TB	10:00 AM - 11:20 AM	TR	room 163 Everitt Elec and Comp Engr Lab	Basar, M
51292: 4 hours Topic: Static and Dynamic Game Theory. Prerequisites: Familiarity with dynamic systems (at the level of ECE 515), background in probability theory (at the level of ECE 313, and preferably ECE 534), familiarity with the basics of linear and nonlinear programming ( at the level of ECE 490).						

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 313, and ECE 476.

CRN	Type	Section	Time	Days	Location	Instructor
39252	discussion-recitation	L	08:00 AM - 09:20 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. Approved for S/U grading only. May be repeated. Prerequisite: 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	Schutt-Aine, 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	Choquette, K

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	Vasudevan, S
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. 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
51560	lecture	KC	09:00 AM - 09:50 AM	MWF	room 241 Everitt Elec and Comp Engr Lab	Choquette, K
51560: 4 hoursTopic: Nano-Photonics. Prerequisites: ECE 455 or equivalent and PHY 486 or ECE 487 or equivalent. Nanophotonics defined as the fusion between nanotechnology and photonics, is an emerging contemporary area of research with new applications. This course will examine the quantum mechanical interaction between light and matter, with a focus on the fundamentals of the optical properties of nanometer scale structures of semiconductors, metals, and composites. Nanoscale optical phenomena such as plasmonics, cavity electrodynamics, sub-wavelength gratings, and meta-materials will be examined.						
48120	lecture-discussion	KJ	12:00 PM - 01:20 PM	TR	room 170 Everitt Elec and Comp Engr Lab	Jain, K
48120: 4 hoursTopic: Micro and Nano Lithography. Prerequisites: ECE 444 or 460, or Physics 402, or MSE 462, or ME 498, or consent of instructor.						
37027	lecture	NA	02:00 PM - 03:20 PM	MW	room 257 Everitt Elec and Comp Engr Lab	Ahuja, N
37027: 4 hoursTopic: Pattern Recognition. Prerequisite: Math 415 or equivalent; ECE 313, Math 461 or Stat 410 or equivalent; and CS 225, ECE 390 or equivalent programming experience.						
52132	lecture	SM1	11:00 AM - 12:20 PM	TR	room 1302 Siebel Center for Comp Sci	Mitra, S
52132: 4 hoursTopic: Modeling and Verification of Real-time and Hybrid systems. Prerequisites: ECE 313, ECE 486 or equivalent, or consent of instructor. Students should understand basic concepts in logic and have some programming experience. Familiarity with automata theory will be useful.						
51839	lecture	SP	11:00 AM - 12:20 PM	TR	room 204 Transportation Bldg	Patel, S
51839: 4 hoursTopic: Massively Parallel Processors: Architectures and Programming Models. Prerequisites: ECE 411 or (CS 225 and CS 433).						
51921	lecture	SV	10:30 AM - 11:50 AM	MW	room 1103 Siebel Center for Comp Sci	Vasudevan, S
51921: 4 hoursTopic: Approaches to Formal Hardware Verification. Prerequisites: ECE 411 or CS/ECE 462 and CS 273 or CS 225 or consent of instructor. Students registering in Section SV (51921) also needs to register for Section S1 (51923).						
51923	laboratory	SV1	ARRANGED			Vasudevan, S
51923: Students registering in Section SV1 (51923) also needs to register in Section SV (51921).						
40256	lecture	YM	10:30 AM - 11:50 AM	TR	room 170 Everitt Elec and Comp Engr Lab	Ma, Y

40256: 4 hours Topic: Sparse Representation and High-Dimensional Geometry for Pattern Recognition. Prerequisites: Math 415/426 (Linear Algebra), ECE490/Math482 (Optimization), and ECE 413/STAT510 (Probability & Statistics). This course covers recent developments of the new mathematical theory of sparse representation and compressed sensing in statistical signal processing, especially the concepts and results that can be readily applied to pattern recognition, computer vision, and image processing.

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						