

COMMUNICATIONS & SIGNAL PROCESSING

Option Supervisor: Professor Ravi Sankar

FOCUS AREAS: Communications (Communication Systems / Networking / Wireless) Signal Processing (Digital Video and Multimedia / Speech / Biomedical)

A. GENERAL CORE COURSES

Engineering Analysis	EEN 5423	Neural Networks and Mathematics of Communication
	EEL 6545	Random Processes in Electrical Engineering

B. FOCUS AREA CORE COURSES

Communications (Communication Systems / Networking / Wireless)

EEL 6534	Communication Systems I
EEL 6593	Mobile and Personal Communication
EEL 6506	Broadband Communication Networks
EEL 6935	Wireless Network Architectures and Protocols

Signal Processing (Digital Video and Multimedia / Speech / Biomedical)

EEL 6502	Digital Signal Processing I
EEL 6752	Digital Signal Processing II
EEL 6592	Digital Video and Multimedia
EEL 6586	Speech Signal Processing

C. ELECTIVES

Communications (Communication Systems / Networking / Wireless)

EEL 6535	Communication Systems II
EEL 6563	Optical Fiber Communication
EEL 6537	Applied Detection Theory
EEL 6846	Coding Theory
EEL 7931	Selected Topics in Communications
EEL 6531	Broadband Telecommunications
EEL 5572	Local and Metropolitan Area Networks
EEL 6935	High Speed and Gigabit Networking
EEL 5935	Wireless Seminar (1 credit hour)
EEL 5936	Wireless Systems (2 credit hours)
EEL 5935	Wireless Circuits and Systems Design Laboratory (2 credit hours)
EEL 6509	Satellite Communications
EEL 5462	Antenna Theory

Signal Processing (Digital Video and Multimedia / Speech / Biomedical)

EEL 6935	Digital Medical Imaging
EEL 6753	Digital Signal Processing III
EEL 5754	Microprocessor Based Digital Signal Processing
EEL 6820	Image Processing
EEL 6345	VLSI for Signal Processing
EEL 6547	Pattern Recognition Theory and Applications

Digital Design

EEL 5344	Digital CMOS/VLSI Design
EEL 6935	Introduction to VHDL
EEL 6764	Principles of Computer Architecture
EEL 6935	MEMS

Interdisciplinary

EEN 5424	Engineering Applications of Complex Analysis
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EGN 5425	Engineering Applications of Advanced Matrix Computations
EEL 5631	Digital Control Systems
EEL 6174	Optimal Filtering and Identification
EEL 6613	Modern Control Theory
EEL 6447	Optoelectronics
EEL 6908-0xx	Independent Study/Project

Others (outside EE Dept) Check with the option supervisor for the courses relevant to your program.

ESI 6336	Queuing Theory
MAS 5215	Number Theory
STA 6876	Time Series Analysis
CAP 5682	Expert and Intelligent Systems
CAP 6615	Neural Networks
COT 6405	Introduction to Theory of Algorithms
CAP 6415	Computer Vision
CGS 5420	Introduction to UNIX and C

D. THESIS/PROJECT/EXAM

M. S. Thesis	EEL 6971-0xx	Communications and Signal Processing Topic (<i>6 credit hours</i>)
M. S. Project	EEL 6908-0xx	Independent Study/Project (<i>3 credit hours</i>)
M. S. Comp. Exam	EEL 6908-099	Independent Study/Comprehensive Exam (<i>1 credit hour</i> registration but <i>no credit</i> towards degree)

COURSE STUDY PLAN RECOMMENDATIONS:

- **Thesis Option**

Design your course program which includes: (1) general core courses in engineering analysis (2) at least 3 of 4 core courses from the primary focus area (based on your thesis topic), (3) at least 1 core course from a secondary focus area, and (4) others selected from the electives. Requires approval of your thesis advisor or the option supervisor.

- **Non-Thesis/Project Option**

Design your course program which includes: (1) general core courses in engineering analysis, (2) at least 3 of 4 core courses from the two focus areas, (3) others selected from the electives. Requires approval of the option supervisor.

- Design your own study-plan for any interdisciplinary program or if the above recommendations do not meet your goals but must be approved by the option supervisor.

COMMUNICATIONS & SIGNAL PROCESSING OPTION

FOCUS AREA DESCRIPTIONS:

Communication Systems deals with all aspects of information transmission over wired (telephone/cable/optical-fiber) and wireless (satellite/digital radio/cellular) channels. Communication plays such a big role in everyday life and one can fully realize the impact of this technology on society. Just imagine living a day without your telephone, television, fax, or cell phone/pager.

Signal Processing deals with the operation of extracting, enhancing, storing, and transmitting useful information. This is probably second only to mathematics in terms of the number of areas it is applied to from acoustics, audio, biomedical, communication, geophysics, image, sonar, speech, radar, terrestrial, to others including mechanical vibrations, material flaws, transportation, and financial data analyses.

Digital Video and Multimedia concentrates on the representation, analysis, and manipulation (in hardware or software) of audio, and 2-D and 3-D video signals, both from a computational and communications point of view. Typical applications are video conferencing, videophones, video on PCs, digital television, HDTV, medical imaging, and automatic object recognition by industrial robots.

Wireless Communications emphasize the design and analysis of communication systems employing wireless media, including cellular telephony, wireless LANs, and mobile satellite communication. Topics are often cross-disciplinary in nature, such as waveform and equalizer design for wide-band CDMA, wireless ATM multimedia networks, handover in cellular systems, and implementation using digital signal processors.

Communication Networks focus on transportation of multimedia between interconnected group of hosts/computers, switches, routers, and host of other input-output devices/sensors. The explosive growth of Internet explains the reason why email has replaced the telephone as the primary source of communication. Truly this century will be the age of the Information revolution.