161. Network Synthesis (3)
Prerequisite: E E 124, 124L. Characteristics of linear, passive, lumped-parameter systems; modern synthesis procedures for realizing driving-point and transfer functions of one-, two-, and n-terminal networks.

166. Microwave Devices and Circuits Design (3)
Prerequisite: E E 136, 136L. Microwave theory and techniques, propagation, waveguides, cavities, circuits, S-parameters, microwave devices including klystrons, traveling-wave tubes, magnetrons, and solid state devices.

166L. Microwave Devices and Circuits Design Laboratory (1)
Prerequisite: E E 166 (concurrently). Microwave measurements selected from measurement of microwave power, standing-wave ratio, impedance, frequency, and klystron characteristics. (3 lab hours; field trips required)

169. Electromagnetic Measurements Laboratory (1)
Prerequisite: E E 136, 136L (or concurrently), 140L. Advanced experiments in precision measurement techniques and computations in electricity, magnetism, electronics, and electromagnetic fields and waves; modern error analysis techniques; computer solutions. (3 lab hours; field trips required)

171. Quantum Electronics (3)
Prerequisite: E E 126. Review of wave properties; cavity mode theory; radiation laws; interaction of radiation and matter; laser amplifiers and oscillators; morphology of masers and lasers.

175. Design of Digital Systems (3)
Prerequisite: EE 106. Logic and memory devices; analog-to-digital and digital-to-analog signal conversion transducers; computer architectures and system structures; control units; memory systems; arithmetic units; input-output subsystems; digital signal transmission and error correction; reliability; self-repair.

175L. Digital Systems Laboratory (1)
Prerequisite: EE 175 (concurrently). Characteristics and use of integrated logic circuits and logic modules; logic circuit measurement techniques; synchronous and asynchronous sequential network realization; design, testing and evaluation of digital subsystems for computation, memory, display, communications, coding, etc. (3 lab hours)

176. Computer-Aided Circuit Design (3)
Prerequisite: E E 124, 124L, 128, 128L. Digital computer methods in analysis and simulation of lumped parameter circuits; topological and matrix representation; modeling; time and frequency domain algorithms; optimization; worst-case and statistical analysis; use of problem oriented programs for circuit design. Introduction to system design.

180. Senior Project (1)
Prerequisite: senior standing in electrical engineering; approved subject; Engr 182 (or concurrently). Study of a problem under supervision of faculty member; final typewritten report required. (Individual project except by special permission)

189A-B. Developments in Engineering (1–1)
(A) Prerequisite: junior standing in engineering or permission of instructor. Presentations and discussions of developments in engineering. (B) Prerequisite: senior standing in engineering or permission of instructor. Presentations and discussions of advanced developments in modern engineering. (Field trips required)

190. Independent Study (1–3; max see reference)
See *Academic Placement—Independent Study.*

191T. Topics in Electrical Engineering (1–3; max total 6)
Prerequisite: permission of instructor. Investigation of selected electrical engineering subjects not in current courses.

195. Electrical Engineering Cooperative Internship (3–4)
Prerequisite: permission of adviser. Engineering practice in an industrial or governmental installation over a period of about 7 months duration. Each period must span a summer-fall or spring-summer interval.