971C. Higher Education Finance
Spring of even years. 3(3-0)
Revenue sources of institutions of higher education. Restrictions and conditions placed upon funds. Administrative structures used to obtain and manage funds.

971D. Institutional Advancement in Higher Education
Fall of odd years. 3(3-0)
Issues and strategies affecting institutional development. Governmental relations, admissions, alumni relations, and general administration.

990. Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
Advanced individual study in an area of K-12 administration or higher, adult, and lifelong education.

991B. Special Topics in Higher, Adult, and Lifelong Education
Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Special topics in the field of higher, adult and lifelong education.

994. Laboratory and Field Experience in Educational Administration
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to doctoral students.
Supervised advanced graduate practica, observations, internships, or externships in K-12 administration and in higher, adult, and lifelong education.

995. Research Practicum in Educational Administration
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to doctoral students. Approval of department.
Supervised research practicum. Design, execution, analysis, presentation, critique, and revision of research projects.

999. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open only to Ph.D. students.

ELECTRICAL AND COMPUTER ENGINEERING ECE

Department of Electrical and Computer Engineering
College of Engineering

200. Electric Circuits
Fall, Spring. 4(4-0) P: (CSE 131 or CSE 230) and (MTH 234 or LBS 220) and (MTH 235 or concurrently or LBS 119 or concurrently)
Resistive circuits. Loop and nodal analysis. Network theorems. Capacitor and inductor circuits. Transient analysis. Forced response. Sinusoidal steady-state response. Frequency response. Introduction to computer-aided analysis.
SA: EE 200

302. Electronic Circuits
Fall, Spring. 3(3-0) P: (ECE 200) ECE 200. R: Open only to students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering.
Volt-ampere characteristics of diodes and transistors. SPICE modeling. Differential, multistage and integrated circuit amplifiers. High frequency effects.
SA: EE 302

303. Electronics Laboratory
Fall, Spring. 1(0-3) P: (ECE 200) R: Open only to students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering. C: ECE 302 concurrently.
Electronic test equipment and measurement fundamentals. Experimental verification of topics covered in EE 200 and EE 302.
SA: EE 303

305. Electromagnetic Fields and Waves I
Fall, Spring. 3(3-0) P: (MTH 235 or LBS 119) and (PHY 184) R: Open only to students in the Department of Electrical and Computer Engineering.
Vector analysis. Static electric field and scalar potential. Dielectric materials. Electric force and energy. Potential problems. Steady currents, magnetic field and vector potential. Magnetic materials and circuits. Magnetic force and torque.
SA: EE 305

306. Electromagnetic Fields and Waves II
Spring, Summer. 3(3-0) P: (ECE 305)
Faraday's law. Maxwell's equations. EM energy conservation. Wave equations and EM waves. Transmission lines. Transient waves. Travelling and standing waves. EM plane waves. EM radiation and antennas.
SA: EE 306

307. Electromagnetic Fields and Waves Laboratory
Spring, Summer. 1(0-3) P: (ECE 306 or concurrently)
Experimental investigation of topics in electromagnetic fields and waves. Experimental verification of material in EE 306.
SA: EE 307

320. Energy Conversion and Power Electronics
Fall, Spring. 3(3-0) P: (ECE 303 and ECE 305)
Power and energy. Magnetics and transformers. Elementary and induction machines. Power semiconductors. Controlled rectifiers and inverters. Power supplies and motor drives.
SA: EE 320

330. Digital Logic Fundamentals
Fall, Spring, Summer. 3(3-0) P: (CSE 131 or CSE 230)
Switching algebra, combinational logic, minimization. Programmable logic devices. Sequential system fundamentals, elements, circuits. Arithmetic operations and circuits. Memory elements and systems. Hierarchical structures. Design problems.
SA: EE 330

331. Microprocessors and Digital Systems
Fall, Spring. 3(3-0) P: (ECE 330) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering. Not open to students with credit in CSE 320.
Microcomputers. Microprocessor architecture. Addressing modes. Assembly language programming. Parallel and serial input and output. Interfacing to memory. Interrupts. Direct Memory Access. Coprocessors. Peripheral device controllers. Applications, design.
SA: EE 331

332. Microprocessors and Digital Systems Laboratory
Fall, Spring. 1(0-3) P: (ECE 330) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering. Not open to students with credit in CSE 320. C: ECE 331 concurrently.
A projects laboratory in a digital-logic design and microprocessor-based systems.
SA: EE 332

345. Electronic Instrumentation and Systems
Fall, Spring, Summer. 3(2-3) P: (MTH 235 or LBS 119) and (PHY 184) and completion of Tier I writing requirement. R: Open only to students in the College of Engineering with the exception of students in the Department of Electrical and Computer Engineering.
Electrical and electronic components, circuits and instruments. Circuit laws and applications, frequency response, operational amplifiers, semiconductor devices, digital logic, counting circuits.
SA: EE 345

360. Signals and Linear Systems
Fall, Spring. 4(4-0) P: (ECE 200) and (MTH 235 or LBS 119) R: Open only to students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering.
Continuous and discrete signals and systems. Convolution, impulse response, system classifications, state variables, differential and difference equations. Fourier series, Fourier transform, Laplace transform. Z-transform. Transfer functions and stability.
SA: EE 360

381. Professionalism, Communication and Ethics (W)
Fall, Spring. 1(1-0) P: (ECE 303 or concurrently) and completion of Tier I writing requirement. R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering.
Examination of issues in professionalism, ethics, and technical communications related to electrical and computer engineering.
SA: EE 481

410. Digital Electronics
Fall, Spring. 3(3-0) P: (ECE 303 and ECE 330) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering.
Transistor switch models. Device simulation models. Logic family characteristics. Latches, flip-flops, timers, memory circuits, standard cells. Gate arrays, programmable logic devices.
SA: EE 410

411. Electronic Design Automation
Spring. 3(3-0) P: (CSE 320 or ECE 332) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering.
Electronic design hierarchy and the role of methodology. Application specific integrated circuits. Hardware descriptive languages. Behavioral and structural models. Semicustom design. Design algorithms. Design project, presentation and reports.
SA: EE 411

413. Control Systems
Fall, Spring. 3(3-0) P: (ECE 360)
Analysis and design of control systems using transfer functions and state variable methods. Design of digital controllers. Microprocessor implementation.
SA: EE 413

414. Control Systems Laboratory
Fall. 1(0-3) P: (ECE 413 or concurrently) R: Open only to juniors or seniors in the Manufacturing Engineering major.
Data acquisition systems, control system analysis, and system identification.
SA: EE 414

415. Computer Aided Manufacturing
Fall. 3(2-3) P: (ECE 413 and ECE 414) or (ME 451) R: Open only to juniors or seniors in the Manufacturing Engineering major.
CAD/CAM fundamentals, programmable controllers, numerical control, NC part programming, sensors, data acquisition systems.
SA: EE 415

418. Algorithms of Circuit Design
Fall. 3(3-0) P: (ECE 303 and ECE 360) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering.
Design of analog electrical circuits, filter functions, ladder synthesis, inductor simulation. Vector Newton-Raphson method. Lossy inductance and capacitance. Statistical tolerance analysis. Optimization by multi-dimensional search. Software algorithms.
SA: EE 418

421. Power System Analysis
Spring. 4(3-3) P: (ECE 320)
Synchronous machines: models and measurements of power components. Symmetrical components. Short circuit analysis and equipment protection. Load flow. Voltage and frequency control. Operation and planning of power systems.
SA: EE 421

435. Electromagnetic Waves and Applications
Fall. 4(3-3) P: (ECE 307)
Open and closed-boundary waveguides. Resonators. Microwave circuit theory. Scattering parameters. Electromagnetic radiation. Properties of antennas. Wave propagation. Measurement of antenna characteristics. Computer-aided design and testing.
SA: EE 435

457. Communication Systems
Spring. 3(3-0) P: (ECE 302 and ECE 360 and STT 351) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering.
Representation and processing of signals in the presence of noise. System performance. Modulation, detection, and coding of information. System design applications in radar, sonar, radio, television, satellite communications, digital telephony, and wireless systems.
SA: EE 457

458. Communication Systems Laboratory
Spring. 1(0-3) P: (ECE 303 and ECE 457 or concurrently)
A projects laboratory in communication systems.
SA: EE 458

466. Digital Signal Processing and Filter Design
Fall. 3(3-0) P: (ECE 360) R: Open only to seniors or graduate students in the Department of Electrical and Computer Engineering.
Discrete Fourier transforms, sampling theorem, circular convolution, Z-transforms. Design of infinite impulse resistance filters using prototypes and algorithmic methods. Design of finite impulse resistance filters by windowing, frequency sampling.
SA: EE 466

474. Principles of Electronic Devices
Fall, Spring. 3(3-0) P: (ECE 302 and ECE 305)
Energy levels in atoms. Crystal properties, energy bands and charge carriers, semiconductors, transport properties of bulk materials. P-n junction diodes, bipolar transistors, field effect transistors.
SA: EE 474

476. Electro-Optics
Fall, Summer. 3(2-3) P: (ECE 303 and ECE 305)
Operating principles and applications of high frequency and photonic devices including impatt, Gunn, photodetector, light-emitting diodes, semiconductor laser devices. Photonic device applications to fiber optic systems.
SA: EE 476

482. Capstone: Computer Systems Design (W)
Fall, Spring. 4(3-3) P: (ECE 332 or CSE 320) and (ECE 381) and completion of Tier I writing requirement.
Design of single board computers. Microprocessor emulation systems. Bus interface requirements. Data transfer. I/O controller design. Interrupt structure. Analog/digital interfacing. Logic analyzers.
SA: EE 482

483. Capstone: Integrated Circuit Design and Fabrication (W)
Fall. 4(3-3) P: (ECE 381 and ECE 474) and completion of Tier I writing requirement.
Processing fundamentals and process simulations. Comparison of current metal oxide semiconductors and bipolar technologies and their limitations. Layout design rules and methodology. Packaging and yield.
SA: EE 483

484. Capstone: Applications of Analog Integrated Circuits (W)
Spring. 4(3-3) P: (ECE 302 and ECE 303 and ECE 381) and completion of Tier I writing requirement.
Circuit design using analog integrated circuits. SPICE macromodeling. Operational amplifiers, comparators, timers, regulators, multipliers and converters. Design project with hardware and software verification.
SA: EE 484

485. Capstone: Digital Control and Robotics (W)
Spring. 4(3-3) P: (ECE 332 and ECE 381 and ECE 413) and completion of Tier I writing requirement.
Robot classifications, kinematics, trajectory planning, digital controller design. Design and implementation of sensor-based robots.
SA: EE 485

490. Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Approval of department.
Independent study of a topic in electrical engineering or computer engineering.
SA: EE 490

491. Special Topics
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to students in the Department of Electrical and Computer Engineering.
Investigation of special topics in electrical engineering or computer engineering.
SA: EE 491

499. Undergraduate Research
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Approval of department.
Independent undergraduate research in contemporary areas of electrical engineering or computer engineering.
SA: EE 499

801. Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Approval of department.
Independent investigation of a topic in electrical engineering compatible with the student's prerequisites, interest, and ability.
SA: EE 801

802. Selected Topics
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department.
Investigation of special topics in electrical engineering.
SA: EE 802

807. Computer System Performance and Measurement
Spring of odd years. 3(3-0) Interdepartmental with Computer Science and Engineering. Administered by Computer Science and Engineering. P: CSE 410, STT 441. R: Open only to Computer Science or Electrical Engineering majors.
Queueing network modelling, general analytic techniques, workload characterization, representing specific subsystems, parameterization. Software and hardware monitors, performance measures. Case studies, software packages.
SA: EE 807

808. Modelling and Discrete Simulation
Fall of even years. 3(3-0) Interdepartmental with Computer Science and Engineering. Administered by Computer Science and Engineering. P: CSE 330, STT 441. R: Open only to Computer Science or Electrical Engineering majors.
Simulation examples, and languages. Mathematical models, petri nets, model validation, random variate generation. Analysis of simulation data. Case studies.
SA: EE 808

809. Algorithms and Their Hardware Implementation
Spring. 3(3-0) Interdepartmental with Computer Science and Engineering.
Arithmetic, signal processing, and image processing algorithms. Array structures: systolic architecture, data flow structure, neural network architecture. Performance analysis.
SA: EE 809

813. Logic Design Principles
Fall. 3(3-0) Interdepartmental with Computer Science and Engineering.
Behavioral modeling. Combinational circuit analysis and design. Sequential-circuit analysis and synthesis. Design for testability. Semicustom and MSI design.
SA: EE 813

818. Robotics
Fall. 3(3-0) P: ECE 413 or ME 451 R: Open only to graduate students in the College of Engineering.
Robot geometry, kinematics, dynamics, trajectory planning, robot programming, sensors, controller design.
SA: EE 818

820. Advanced Computer Architecture
Fall, Spring. 3(3-0) Interdepartmental with Computer Science and Engineering. Administered by Computer Science and Engineering. P: CSE 410, CSE 420. R: Open only to Computer Science or Electrical Engineering majors.
Instruction set architecture. Pipelining, vector processors, cache memory, high bandwidth memory design, virtual memory, input and output. Benchmarking techniques. New developments related to single CPU systems.
SA: EE 820

822. Parallel Processing Computer Systems
Spring. 3(3-0) Interdepartmental with Computer Science and Engineering. Administered by Computer Science and Engineering. P: CSE 820. R: Open only to Computer Science or Electrical Engineering majors.
Massively parallel SIMD processors, multiprocessor architectures, interconnection networks, synchronization and communication. Memory and address space management, process management and scheduling. Parallel compilers, languages, performance evaluation.
SA: EE 822

823. Power System Stability and Control
Fall of even years. 3(3-0) P: ECE 826.
Analysis and simulation of small and large disturbance stability of power systems. Generator, exciter, voltage regulator models. Design of excitation systems and power system stabilizers.
SA: EE 823

824. Power System Operation and Control
Fall of odd years. 3(3-0) P: ECE 421; STT 351.
Operation planning of power systems including loadflow, unit commitment, production cost methods. On line operation and control including automatic generation control, economic dispatch, security assessment, state estimation.
SA: EE 824

825. Alternating Current Electrical Machines and Drives
Spring of even years. 3(3-0) P: ECE 320.
Analysis, modeling and design of synchronous, induction, and switched reluctance machines. Design drives for motion control and power system applications.
SA: EE 825

826. Linear Control Systems
Fall. 3(3-0) P: MTH 314.
Vector spaces, representation, system description, solution to the state equations, stability, controllability and observability. Adjoints of linear maps. Eigenstructure assignment. Partial and full order observers. Disturbance decoupling.
SA: EE 826

827. Nonlinear Systems Analysis
Spring. 3(3-0) P: ECE 826.
Existence, uniqueness and continuity of solutions. Phase portraits. Limit cycles. Linearization. Stability of equilibria and periodic orbits. Lyapunov stability. Describing functions. Perturbation. Averaging. Singular perturbation. Control applications.
SA: EE 827

829. Optimal Multivariable Control
Spring. 3(3-0) P: ECE 826.
Performance and robustness. Minimum time, minimum energy and regulator. Optimal control and minimum principle. LQG, Nyquist, and H-infinity design methods.
SA: EE 829

831. Analog Circuit Theory
Fall of even years. 3(3-0)
Positive real functions. Filter approximations. Passive and active network synthesis. Nullor network analysis and synthesis. Active filters. Stability. Sensitivity.
SA: EE 831

832. Analog Integrated Circuit Design
Fall of odd years. 3(3-0)
Technology. Device modeling. Circuit simulation. Integrated circuit building blocks. Amplifiers, comparators, converters. Switched-capacitor filters. Analog signal processing circuits.
SA: EE 832

835. Advanced Electromagnetic Fields and Waves I
Fall. 3(3-0)
Electrostatics, magnetostatics, electrodynamics and Maxwell's equations. Potential functions. Eigenfunction expansion. Green's functions. Radiation of EM waves. EM boundary-value problems. TEM waves. Maxwell's equations with magnetic sources.
SA: EE 835

836. Advanced Electromagnetic Fields and Waves II
Spring. 3(3-0) P: ECE 835.
Theory of guided transmission system. Microstrip lines, metallic and dielectric waveguides. EM cavities. Excitation and discontinuities of waveguides. Surface wave and radiation modes. Integrated optics. Scattering of EM waves.
SA: EE 836

841. Fourier Optics
Spring of odd years. 3(2-3) P: ECE 360; ECE 435 or ECE 835.
Scalar diffraction theory. Fourier expansion of optical fields. Spatial linear systems and information processing. Lenses. Optical imaging systems. Holgraphy. Measurements of optical systems.
SA: EE 841

842. Quantum Electronics
Fall of even years. 3(3-0) P: ECE 835, ECE 874.
Quantum and electromagnetic theory of lasers. Optical resonators. Laser oscillation and amplification. Characterization of lasers. Specific laser examples.
SA: EE 842

847. Analog and Digital Communications
Fall of odd years. 3(3-0) P: ECE 457, ECE 863.
Optimum signal design in noisy channels, matched filters, quadrature sampling of bandpass signals in noise. Coherent and non-coherent binary modulation such as PSK, FSK, DPSK. M-ary modulation, intersymbol interference, spread spectrum.
SA: EE 847

850. Electrodynamics of Plasmas
Spring of odd years. 3(3-0) Interdepartmental with Astronomy and Astrophysics; and Physics. P: ECE 835 or PHY 488.
Plasma kinetic and macroscopic plasma transport theory. Electromagnetic wave propagation and charged particle diffusion processes in plasma. Electromagnetic energy absorption via elastic and inelastic collisions. Dc, rf, and microwave discharges.
SA: EE 850

863. Analysis of Stochastic Systems
Fall. 3(3-0) P: STT 441.
Advanced topics in random variable theory. Stochastic processes and stochastic calculus. Optimal systems for filtering and detection.
SA: EE 863

864. Detection and Estimation Theory
Spring. 3(3-0) P: ECE 863
Analysis and implementation of statistical estimation and detection methods used in signal processing, communications, and control applications. Bayesian, Neyman-Pearson, and minimax detection schemes. Bayesian, mean-square-error, and maximum-likelihood estimation methods.
SA: EE 864

865. Analog and Digital Communications
Fall of odd years. 3(3-0) P: ECE 457, ECE 863
Optimum signal design in noisy channels, matched filters, quadrature sampling of bandpass signals in noise. Coherent and non-coherent binary modulation such as PSK, FSK, DPSK, M-ary modulation, intersymbol interference, spread spectrum.
SA: EE 865

874. Physical Electronics
Fall. 3(3-0)
Applications of quantum mechanics and statistical mechanics in solids. Band theory of semiconductors. Electrical transport phenomena. Pn junctions.
SA: EE 874

875. Electronic Devices
Spring. 3(3-0) P: ECE 874.
Operating properties of semiconductor devices including DC, AC, transient and noise models of FET, BJT, metal-semiconductor contact, heterostructure, microwave and photonic devices.
SA: EE 875

885. Artificial Neural Networks
Fall. 3(3-0) Interdepartmental with Computer Science and Engineering.
Overview of neuro-engineering technology. Basic neural network architectures. Feedforward and feedback networks. Temporal modeling. Supervised and unsupervised learning. Implementation. Basic applications to pattern recognition.
SA: EE 885

899. Master's Thesis Research
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 24 credits in all enrollments for this course.
SA: EE 899

920. Selected Topics in High Performance Computer Systems
Spring of odd years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. Interdepartmental with Computer Science and Engineering. Administered by Computer Science and Engineering. P: CSE 822. R: Open only to Computer Science or Electrical Engineering majors.
Design of high performance computer systems. Seminar format.
SA: EE 920

921. Advanced Topics in Digital Circuits and Systems (MTC)
Fall, Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Computer Science and Engineering.
Topics vary each semester. Topics such as testable and fault-tolerant digital systems, embedded architectures.
SA: EE 921

925. Advanced Topics in Power (MTC)
Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Topics vary each semester. Topics such as advanced stability and control of power systems, power system planning, or advanced machine drives.
SA: EE 925

929. Advanced Topics in Electromagnetics (MTC)
Fall, Spring. 3 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course.
Topics vary each semester. Topics such as planar waveguides and circuits, antenna theory, geometrical theory of diffraction.
SA: EE 929

931. Advanced Topics in Electronic Devices and Materials (MTC)
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
Topics vary each semester. Topics such as VLSI technology, microdevices and microstructures, properties of semiconductors.
SA: EE 931

960. Advanced Topics in Control (MTC)
Fall. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course.
Topics vary each semester. Topics such as adaptive control, or nonlinear control.
SA: EE 960

963. Advanced Topics in Systems (MTC)
Fall, Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Topics vary each semester. Topics such as system identification and adaptive filtering, robot dynamics and control, or learning in artificial neural networks.
SA: EE 963

966. Advanced Topics in Signal Processing (MTC)
Fall, Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Topics vary each semester. Topics such as discrete time processing of speech signals, multidimensional signal processing, or detection and estimation theory.
SA: EE 966

989. Advanced Topics in Plasma (MTC)
Fall of odd years. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course.
Topics vary each semester. Topics such as plasma processing for IC fabrication, plasma diagnostic techniques.
SA: EE 989

999. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 72 credits in all enrollments for this course.
SA: EE 999

ENGINEERING EGR

College of Engineering

101. Preview of Science
Fall. 1(1-0) Interdepartmental with Natural Science; Agriculture and Natural Resources; and Social Science. Administered by Natural Science. R: Approval of College
Overview of natural sciences. Transitional problems. Communications and computer skills. Problem solving skills. Diversity and ethics problems in science. Science and society.

124. Internet and Technology
Fall, Spring, Summer. 2(2-0)
The Internet from a user perspective and from a technical perspective. History and social impact of the Internet. Internet tools.

150. Engineers and the Engineering Profession
Spring. 2(2-0) R: Open only to freshmen or sophomores.
Overview of the engineering profession. Historical background. Engineering specialities. Engineers at work. Professionalism and ethics. Communication skills. Future trends and challenges.

160. Diversity and Engineering
Fall, Spring. 2(2-0) P: (MTH 132 or concurrently) R: Open only to freshmen or sophomores in the College of Engineering.
Issues relevant to underrepresented engineering groups. Diversity and engineering. Transitional problems. Career options. Communication skills.