Telecommunications Engineering

**TE 1202** Introduction to Electrical Engineering (2 semester hours) **TE 1202** introduces the discipline of engineering. It includes a 1.5-hour lecture per week plus a 3-hour fundamentals laboratory that stresses learning about laboratory procedures and equipment. Topics include: Learning the use of common laboratory electronic equipment; understanding the assembly of electronic circuits; and making various measurements. Students also learn how to work together with a partner and how to write a laboratory report. The lecture introduces general engineering practices, engineering research at UTD, engineering activities at selected local companies, and concepts such as innovation and invention. The course also includes lectures and projects on communication, understanding the importance of lifelong learning, ethics, and a knowledge of contemporary issues. **TE 1202** may be taken by students outside of engineering in order to learn about the engineering profession. (Same as **CE 1202** and **EE 1202**) (1.5-3) S

**TE 1337 (COSC 1337)** Computer Science I (3 semester hours) Introduction to object-oriented software analysis, design, and development. Classes and objects. Object composition and polymorphism. Sorting, searching, recursion. Strings using core classes. Inheritance and interfaces. Graphical User Interfaces. Includes a comprehensive programming project. Prerequisite: **CS 1336** with a grade of C or better or equivalent. (Same as **CE 1337** and **CS 1337**) (3-0) S

**TE 2305 (MATH 2305)** Discrete Mathematics for Computing I (3 semester hours) Principles of counting, Logic and proof methods, including induction. Basic recurrence relations. Basics of algorithm complexity. Sets, relations, functions. Elementary graph theory. Elementary number theory. Students cannot get credit for both **TE 2305** and (**CE 3307** or **TE 3307**). Prerequisite: **MATH 1326** or **MATH 2413** or **MATH 2417**. (Same as **CE 2305** and **CS 2305**) (3-0) S

**TE 2336 (COSC 2336)** Computer Science II (3 semester hours) Exceptions and number formatting. File input/output using Stream classes. Implementation of primitive data structures, including linked lists (all types), stacks, queues, and binary trees. Advanced data manipulation using core classes. Introduction to multi-threading, multimedia, and networking. Includes a comprehensive programming project. Prerequisite: **CE 1337** or **CS 1337** or **TE 1337**. Prerequisite or corequisite: **CE 2305** or **CS 2305** or **TE 2305**. (Same as **CE 2336** and **CS 2336**) (3-0) S

**TE 3101** Electrical Network Analysis Laboratory (1 semester hour) Laboratory to accompany **TE 3301**. Design, assembly and testing of linear electrical networks and systems. Use of computers to control electrical equipment and acquire data. Prerequisites: (**CE 1202** or **EE 1202** or **TE 1202**) and **RHET 1302**. Corequisite: **TE 3301**. (Same as **CE 3101** and **EE 3101**) (0-1) S

**TE 3102** Signals and Systems Laboratory (1 semester hour) Laboratory based on MATLAB and LabVIEW to provide implementation experience on topics covered in **TE 3302**. Laboratory experiments cover linear time-invariant systems, convolution, Fourier series, continuous Fourier transform, sampling, discrete Fourier transform, analog and digital filtering. Each lab is followed by a design application. Corequisite: **TE 3302**. Prerequisite: **RHET 1302**. (Same as **CE 3102** and **EE 3102**) (0-1) S

**TE 3150** Communications Systems Laboratory (1 semester hour) Laboratory to accompany **TE 3350**. Fundamental elements of communications systems hardware; use of spectrum analyzers and other
measurement instruments typically encountered in communication systems; design of active filters in communications systems; analog frequency and amplitude modulators and demodulators; data communication systems. Corequisite: **TE 3350**. Prerequisite: **(CE 3301 or EE 3301 or TE 3301)** and **RHET 1302**. (Same as **EE 3150**) (0-1) S

**TE 3301** Electrical Network Analysis (3 semester hours) Analysis and design of RC, RL, and RLC electrical networks. Sinusoidal steady state analysis of passive networks using phasor representation; mesh and nodal analyses. Introduction to the concept of impulse response and frequency analysis using the Laplace transform. Prerequisites: **MATH 2420** and **PHYS 2326**. Corequisite: **TE 3101**. (Same as **CE 3301** and **EE 3301**) (3-0) S

**TE 3302** Signals and Systems (3 semester hours) Introduces the fundamentals of continuous and discrete-time signal processing. Linear system analysis including convolution and impulse response, Fourier series, Fourier transform and applications, discrete-time signal analysis, sampling and z-transform. Prerequisite: **ENGR 3300**. Corequisite: **TE 3102**. (Same as **CE 3302** and **EE 3302**) (3-0) S

**TE 3340** Computer Architecture (3 semester hours) This course introduces the concepts of computer architecture by going through multiple levels of abstraction, and the numbering systems and their basic computations. It focuses on the instruction-set architecture of the MIPS machine, including MIPS assembly programming, translation between MIPS and C, and between MIPS and machine code. General topics include performance calculation, processor datapath, pipelining, and memory hierarchy. Students who have already completed **CS 2310** cannot receive credit for this course. Students cannot receive credit for both **CS 3340** or **SE 3340** or **TE 3340** and **(CE 4304 or EE 4304)**. Prerequisites: **(CE 1337 or CS 1337 or TE 1337 or equivalent)** and **(CE 2305 or CS 2305 or TE 2305)**. (Same as **CS 3340** and **SE 3340**) (3-0) S

**TE 3345** Data Structures and Introduction to Algorithmic Analysis (3 semester hours) Analysis of algorithms including time complexity and Big-O notation. Analysis of stacks, queues, and trees, including B-trees, Heaps, hashing, and advanced sorting techniques. Disjoint sets and graphs. Course emphasizes design and implementation. Students that completed **CE 3346** or **TE 3346** cannot receive credit for this course. Prerequisites: **(CE 2305 or CS 2305 or TE 2305)** and **(CE 2336 or CS 2336 or TE 2336)**. Prerequisite or corequisite: **CS 3341** or **SE 3341** or **ENGR 3341**. (Same as **CE 3345** and **CS 3345** and **SE 3345**) (3-0) S

**TE 3350** Communications Systems (3 semester hours) Fundamentals of communications systems. Review of probability theory and Fourier transforms. Filtering and noise. Modulation and demodulation techniques, including amplitude, phase, and pulse code. Time division multiplexing. This class may be offered as either regular or honors sections (H). Prerequisites: **ENGR 3300** and **(CE 3301 or EE 3301 or TE 3301)** and **(CE 3302 or EE 3302 or TE 3302)** and **ENGR 3341**. Corequisite: **EE 3150** or **TE 3150**. (Same as **EE 3350**) (3-0) S

**TE 4141** Digital Systems Laboratory (1 semester hour) Laboratory to accompany **TE 4341**. The purpose of this laboratory is to give students an intuitive understanding of digital circuits and systems. Laboratory exercises include construction of simple digital logic circuits using prototyping kits and board-level assembly of a personal computer. Students who have already completed **CS 2110** cannot receive credit for this course. Corequisite: **CS 4341** or **TE 4341**. (Same as **CS 4141**) (0-2) S

**TE 4341** Digital Logic and Computer Design (3 semester hours) Boolean algebra and logic circuits;
synchronous sequential circuits; gate level design of ALSU, registers, and memory unit; register transfer operations; design of data path and control unit for a small computer; Input-Output interface. Students cannot receive credit for both (CS 4341 or TE 4341) and (CE 3320 or EE 3320). Prerequisites: (CE 2310 or EE 2310) or (CS 3340 or SE 3340 or TE 3340) and PHYS 2326. Corequisite: (CS 4141 or TE 4141). (Same as CS 4341) (3-0) S

TE 4348 Operating Systems Concepts (3 semester hours) An introduction to fundamental concepts in operating systems: their design, implementation, and usage. Topics include process management, main memory management, virtual memory, I/O and device drivers, file systems, secondary storage management, and an introduction to critical sections and deadlocks. Prerequisites: (CS 3340 or SE 3340 or TE 3340 or equivalent), and (CE 3345 or CS 3345 or SE 3345 or TE 3345), and a working knowledge of C and UNIX. (Same as CE 4348 and CS 4348 and SE 4348) (3-0) S

TE 4360 Digital Communications (3 semester hours) Information, digital transmission, channel capacity, delta modulation, and differential pulse code modulation are discussed. Principles of coding and digital modulation techniques such as Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Continuous Phase Frequency Shift Keying (CPFSK) are introduced. M-ary signaling such as Quadrature amplitude and phase shift keying, and M-ary PSK and FSK are also discussed. Prerequisite: E E 3350 or TE 3350. (Same as EE 4360) (3-0) T

TE 4361 Introduction to Digital Signal Processing (3 semester hours) An introduction to the analysis and design of discrete linear systems, and to the processing of digital signals. Topics include time and frequency domain approaches to discrete signals and systems, the Discrete Fourier Transform and its computation, and the design of digital filters. Prerequisite: CE 3302 or EE 3302 or TE 3302. (Same as EE 4361) (3-0) T

TE 4365 Introduction to Wireless Communication (3 semester hours) Introduction to the basic system concepts of cellular telephony. Mobile standards, mobile system architecture, design, performance and operation. Voice digitization and modulation techniques; PCS technologies. Prerequisite: EE 3350 or TE 3350. (Same as EE 4365) (3-0) Y

TE 4367 Telecommunication Networks (3 semester hours) Trunking and queuing, switching technologies: voice, data, video, circuit switching and packet switching, transmission technologies and protocols, transmission media - copper, fiber, microwave, satellite, protocols - bipolar formats, digital hierarchy, optical hierarchy, synchronization, advanced switching protocols and architectures; frame relay, ATM, HDTV, SONET. Prerequisite or Corequisite: EE 3350 or TE 3350. (Same as EE 4367) (3-0) Y

TE 4388 Senior Design Project I (3 semester hours) First of two sequential semesters devoted to a team project that engages students in the full engineering design process. The goal of senior design projects is to prepare the student to run/participate in engineering projects related to an appropriate industry. Thus, all project teams are to follow standard industrial practices and methods. Teams must carry the engineering project to completion, examining real world and multiple design constraints, following applicable industrial and business standards. Such constraints may include but are not limited to: economic, environmental, industrial standards, team time/resource management and cross-disciplinary/departmental result integration. Students are required to work in teams that include collaborative design interaction. Additionally, cross-disciplinary teams are encouraged but not required. In Senior Design I, project proposals will be written, reviewed and approved. Initial designs will be completed and
corresponding constraints will be determined. All students will participate in a public oral and poster presentation following departmental approved guidelines at a departmental approved time and location. Teams will also submit a written end of semester progress report and documented team communication (complete sets of weekly reports and/or log books) following guidelines approved by the faculty. Students must have completed ECS 3390 and one of the following prerequisite sequences: ((CE 3311 or EE 3311), and (CE 3320 or EE 3320), and (CE 3345 or CS 3345 or SE 3345 or TE 3345), and (CE 3354 or CS 3354 or SE 3 354)), or (((ENGR 3300 and (CE 3302 or EE 3302 or TE 3302), and (CE 3311 or EE 3311), and (CE 3320 or EE 3 320)), or ((ENGR 3300 and (CE 3302 or EE 3302 or TE 3302), and (CE 3345 or CS 3345 or SE 3345 or TE 334 5)); prerequisite or corequisite: EE 3350 or TE 3350.] (Same as CE 4388 and EE 4388) (3-0) S

**TE 4389** Senior Design Project II (3 semester hours) Continuation of the Senior Design project begun in the previous semester. In Senior Design II, projects based on approved project proposals will be completed. All limitations of the design will be determined and addressed. All students will participate in a public oral presentation following faculty-approved guidelines at a faculty-approved time and location. Teams will also submit a written final report and documented team communication (complete sets of weekly reports and/or log books) following faculty-approved guidelines. Prerequisite: CE 4388 or EE 4388 or TE 4388. (Same as CE 4389 and EE 4389) (3-0) S

**TE 4390** Computer Networks (3 semester hours) The design and analysis of computer networks. Topics include the ISO reference model, transmission media, medium-access protocols, LANs, data link protocols, routing, congestion control, internetworking, and connection management. Students cannot get credit for both (CE 4390 or CS 4390 or TE 4390) and EE 4390. Prerequisite: CE 3345 or CS 3345 or SE 3345 or TE 3345 or equivalent. (Same as CE 4390 and CS 4390) (3-0) S

**TE 4v95** Undergraduate Topics in Telecommunications Engineering (1-9 semester hours) Subject matter will vary from semester to semester. May be repeated for credit as topics vary (9 hours maximum). ([1-9]-0) R

**TE 4v98** Undergraduate Research in Telecommunications Engineering (1-9 semester hours) May be repeated for credit as topics vary (9 hours maximum). This course may be used as an honors course. Instructor consent required. ([1-9]-0) R