Telecommunications Engineering

**TE 1202** Introduction to Electrical Engineering II (2 semester credit 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 UT Dallas, 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 credit hours) Review of control structures and data types with emphasis on structured data types. Applies the object-oriented programming paradigm, focusing on the definition and use of classes along with the fundamentals of object-oriented design. Includes basic analysis of algorithms, searching and sorting techniques, and an introduction to software engineering. Programming language of choice is C/C++. Students will also be registered for an exam section. 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 credit hours) Principles of counting. Boolean operations. Logic and proof methods. Recurrence relations. Sets, relations, functions. Elementary graph theory. Elementary number theory. Prerequisite: ALEKS score required or **MATH 2312** with a grade of C or better. (Same as CE 2305 and CS 2305) (3-0) S

**TE 2336** (COSC 2336) Computer Science II (3 semester credit hours) Further applications of programming techniques, introducing the fundamental concepts of data structures and algorithms. Topics include recursion, fundamental data structures (including stacks, queues, linked lists, hash tables, trees, and graphs), and algorithmic analysis. Includes comprehensive programming projects. Programming language of choice is Java. Credit cannot be received for both **CS 2337** and (CS 2336 or CE 2336 or TE 2336). Prerequisite: AP score of at least 4. Prerequisite or Corequisite: **CE 2305** or **CS 2305** or **TE 2305** with a grade of C or better. (Same as CE 2336 and CS 2336) (3-0) S

**TE 3101** Electrical Network Analysis Laboratory (1 semester credit 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) (0-3) S

**TE 3102** Signals and Systems Laboratory (1 semester credit hour) In this laboratory course, students will acquire hands on experience in the implementation of the theory and concepts covered in the Signals and Systems lecture course **TE 3302**. The software tools that are utilized include MATLAB and smartphone programming environments. The labs consist of introduction to the software tools utilized, linear time-invariant systems and convolution, Fourier series, continuous-time Fourier transform, sampling and discrete Fourier transform. Corequisite: **TE 3 302**. Prerequisite: **RHET 1302**. (Same as CE 3102 and EE 3102) (0-3) S

**TE 3150** Communications Systems Laboratory (1 semester credit 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 33 50.** Prerequisite: (CE 3301 or EE 3301 or TE 3301) and RHET 1302. (Same as EE 3150) (0-3) S

**TE 3301** Electrical Network Analysis (3 semester credit 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.** (Same as CE 3301 and EE 3301) (3-0) S

**TE 3302** Signals and Systems (3 semester credit 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.** (Same as CE 3302 and EE 3302) (3-0) S

**TE 3340** Computer Architecture (3 semester credit 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. Credit cannot be received for both courses, (CS 33 40 or SE 3340 or TE 3340) and (CE 4304 or EE 4304). Prerequisites: (CE 1337 or CS 1337 or TE 13 37 with a grade of C or better or equivalent) and (CE 2305 or CS 2305 or TE 2305 with a grade of C or better). (Same as CS 3340 and SE 3340) (3-0) S

**TE 3345** Data Structures and Introduction to Algorithmic Analysis (3 semester credit 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. Prerequisites: (CE 2305 or CS 2305 or TE 2305 with a grade of C or better) and (CE 2336 or CS 2336 or TE 2336 with a grade of C or better). 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 credit 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.** (Same as **EE 3350**) (3-0) S

**TE 4141** Digital Systems Laboratory (1 semester credit 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. Corequisite: **CS 4341** or **TE 4 341.** (Same as **CS 4141**) (0-3) S

**TE 4341** Digital Logic and Computer Design (3 semester credit 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. Credit cannot be received for both courses, (CS 4341 or TE 4341) and (CE 332 0 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 credit hours) An introduction to fundamental concepts in operating systems and how they are realized in a practical operating system such as UNIX. 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) (3-0) S

**TE 4360** Digital Communications (3 semester credit 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. Prerequisites: ENGR 3341 and (CE 3302 or EE 3302 or TE 3302). (Same as EE 4360) (3-0) T

**TE 4361** Introduction to Digital Signal Processing (3 semester credit 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 credit 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. Prerequisites: EE 3302 and ENGR 3341. (Same as EE 4365) (3-0) Y

**TE 4367** Telecommunication Networks (3 semester credit hours) Trunking and queueing, 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 credit 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/departamental 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. Prerequisites: 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 3354)), or ([(ENG 3300 and (CE 3302 or EE 3302 or TE 3302), and (CE 3311 or EE 3311), and (CE 3320 or EE 3320)), or ([(ENGR 3300 and (CE 3302 or EE 3302 or TE 3302), and (CE 3345 or CS 3345 or SE 3345 or TE 3345)); 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 credit 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 credit 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. Credit cannot be received for both courses, (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 credit hours) May be repeated for credit as topics vary (9 semester credit hours maximum). Instructor consent required. ([1-9]-0) R

TE 4V98 Undergraduate Research in Telecommunications Engineering (1-9 semester credit hours) This course may be used as an honors course. May be repeated for credit as topics vary (9 semester credit hours maximum). Instructor consent required. ([1-9]-0) R