

COLLEGE OF ENGINEERING
ELECTRICAL AND ELECTRONICS ENGINEERING INSTITUTE
LIST OF COURSES

EEE Courses

1. **EEE 111 Introduction to Programming and Computation.** Working principles of a computing machine; fundamental programming constructs; and software and hardware abstractions. Prerequisite: None. 5 h (2h Lec, 3h Lab) 3 u (2u Lec, 1u Lab).
2. **EEE 113 Introduction to Electrical and Electronics Engineering Systems.** Principles of operation; limitations and trade-offs from a systems perspective. Prerequisite: None. Corequisite: Math 21 Elementary Analysis I. 3 h (Lec) 3 u.
3. **EEE 118 Electrical and Electronics Engineering Laboratory I.** Laboratory procedures and practices; modeling systems as black boxes; standard electronic instruments and circuits; data collection and analysis. Prerequisite: None. 3 h (Lab) 1 u.
4. **EEE 121 Data Structures and Algorithms for Electrical and Electronics Engineering.** Tools and methodologies for modeling and solving different programming problems across multiple programming paradigms. Introduction to organizing and modeling various kinds of data with emphasis on the relationship of algorithms and programming. Prerequisite: EEE 111 Introduction to Programming and Computation. 5 h (2h Lec, 3 h Lab) 3 u (2u Lec, 1u Lab).
5. **EEE 123 Circuits and Electronics I.** Resistive and nonlinear circuits under steady-state constant and sinusoidal stimuli. Prerequisite: None. Corequisite: Math 21 Elementary Analysis I. 3h (Lec) 3 u.
6. **EEE 128 Electrical and Electronics Engineering Laboratory II.** Design, execution, and verification of the behavior of resistive and nonlinear circuits with an emphasis on printed circuit board (PCB) implementation. Prerequisite: EEE 118 Electrical and Electronics Engineering Laboratory I. 3 h (Lab) 1 u.
7. **EEE 131 Electronic Devices and Circuits.** Device fundamentals of diodes, bipolar junction transistors, and field effect transistors essential in understanding current-voltage relationships; modeling and analysis of diode and single-transistor circuits. Prerequisite: EEE 123 Circuits and Electronics I, and Physics 72 Elementary Physics II. 3 h (Lec) 3 u.
8. **EEE 133 Circuits and Electronics II.** Transient analysis and design of resistive and nonlinear circuits under impulse, step, ramp, parabolic, and sinusoidal stimuli. Prerequisite: EEE 123 Circuits and Electronics I. 3 h (Lec) 3 u.

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9. **EEE 135 Electromagnetic Fields I.** Fundamentals of classical electromagnetics theory and applications to electrical and electronics engineering. Prerequisite: Physics 72 Elementary Physics II. Co-requisite: Math 23 Elementary Analysis III. 3 h (Lec) 3 u.
10. **EEE 137 Probability, Statistics and Random Processes in Electrical and Electronics Engineering.** Applications of probability theory, descriptive and inferential statistics, probabilistic analysis of engineering problems, modeling uncertainties, and making predictions. Prerequisite: Math 22 Elementary Analysis II. 3 h (Lec) 3 u.
11. **EEE 138 Electrical and Electronics Engineering Laboratory III.** Applications of semiconductor devices, with emphasis on audio frequency circuit. Prerequisite: EEE 128 Electrical and Electronics Engineering Laboratory II. 3 h (Lab) 1 u.
12. **EEE 141 Electronic Circuits and Systems.** Analysis and design of transistor amplifiers and switching circuits. Role of feedback in improving circuit characteristics. Design considerations for electronic systems. Prerequisite: EEE 131 Electronic Devices and Circuits. 3 h (Lec) 3 u.
13. **EEE 143 Switching Theory and Digital Logic Design.** Fundamental concepts in Boolean Algebra for analyzing and designing digital logic circuits using Boolean expressions, logic gates, digital integrated circuit building blocks and hardware description language. Prerequisite: None. 3 h (Lec) 3 u.
14. **EEE 145 Electromechanical Energy Converters.** Principles of conversion, operation, modeling, and analysis of common converters. Prerequisite: Physics 72 Elementary Physics II. 3 h (Lec) 3 u.
15. **EEE 147 Signals and Systems.** Mathematical tools for analysis and modeling of signals and systems in time and frequency domain and their applications in electrical and electronics engineering. Prerequisite: Math 22 Elementary Analysis II. 3 h (Lec) 3 u.
16. **EEE 148 Electrical and Electronics Engineering Laboratory IV.** Design and application of wave generating circuits, programmable hardware, and signal processing in the monitoring, characterization, operation, and control of electric machines and loads. Prerequisite: EEE 128 Electrical and Electronics Engineering Laboratory II. 3 h (Lab) 1 u.
17. **EEE 151 Analog and Digital Control.** Introduction to the analysis and design of control systems for continuous-time, discrete-time, and hybrid systems. Prerequisite: EEE 147 Signals and Systems, and ES 101 Mechanics of Particles and Rigid Bodies. 3 h (Lec) 3 u.

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- 18. EEE 153 Computer Organization and Embedded Systems I.** Analysis and design of different aspects of computer organization and their effects in the performance of a system and in programming using assembly language. Prerequisite: EEE 143 Switching Theory and Digital Logic Design. 3 h (Lec) 3 u.
- 19. EEE 155 Introduction to Electric Power Systems.** Components, analysis, and operation of balanced electric power systems. Prerequisite: EEE 123 Circuits and Electronics I. 3 h (Lec) 3 u.
- 20. EEE 157 Communication Systems and Networks.** Design and analysis of the fundamental processes and mechanisms involved in information transfer. Prerequisite: EEE 147 Signals and Systems. 3 h (Lec) 3 u.
- 21. EEE 158 Electrical and Electronics Engineering Laboratory V.** Hardware and software solutions for closed loop systems: Prerequisites: EEE 128 Electrical and Electronics Engineering Laboratory II, and EEE 147 Signals and Systems. 3 h (Lab) 1 u.
- 22. EEE 192 Electrical and Electronics Engineering Laboratory VI.** Design project applying the knowledge, skills and competencies acquired in the Electrical and Electronics Engineering fundamental courses. Prerequisite: EEE 158 Electrical and Electronics Engineering Laboratory V. 3 h (Lab) 1 u.
- 23. EEE 196 Undergraduate Colloquium.** Planning and development of a project proposal. Prerequisite: EEE 192 Electrical and Electronics Engineering Laboratory IV. 6 h (3h Colloquium, 3h Lab) 4 u. Student must be endorsed by a project adviser. Course may be taken more than once, provided the student is under a different program offered by the Electrical and Electronics Engineering.

CoE Courses

- 24. CoE 161 Introduction to Information and Complexity.** Advanced course on information theory and computational complexity, starting from Shannon's information theory and Turing's theory of computation, leading to the theory of Kolmogorov complexity. Prerequisites: EEE 111 Introduction to Programming and Computation, and EEE 137 Probability, Statistics and Random Processes in Electrical and Electronics Engineering. 3 h (Lec) 3 u.
- 25. CoE 163 Computing Architectures and Algorithms.** Advanced course on the foundations and techniques in high performance software development for signal processing and other numerical functions including transforms, filters, and basic linear algebra algorithms, taking into

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account memory hierarchy and other microarchitectural features. Prerequisites: Math 40 Linear Algebra, EEE 121 Data Structures and Algorithms for EEE, and EEE 153 Computer Organization and Embedded Systems I. 3 h (Lec) 3 u.

- 26. CoE 164 Computing Platforms.** Advanced laboratory course on the application of the concepts, methodologies, skills, and tradeoffs in designing/building computing systems to solve challenging problems, in an efficient and structured way. Prerequisite: None. Co-requisite: CoE 161 Introduction to Information and Complexity, and CoE 163 Computing Architectures and Algorithms. 3 h (lab) 1 u.
- 27. CoE 165 Computer Organization and Embedded Systems II.** Advanced course on the modeling, design, and analysis of computational systems that interact with physical processes. Prerequisite: EEE 153 Computer Organization and Embedded Systems I. Co-requisite: CoE 163 Computing Architectures and Algorithms. 3 h (Lec) 3 u.
- 28. CoE 167 Computing Systems.** Advanced course on the design of complex software and hardware systems, including techniques for reliability, managing complexity, and the coordination of parallel activities. Prerequisites: EEE 121 Data Structures and Algorithms for Electrical and Electronics Engineering, and EEE 157 Communication Systems and Networks. Corequisite: CoE 163 Computing Architectures and Algorithms. 3 h (Lec) 3 u.
- 29. CoE 168 Computing Solutions for Contemporary Issues.** Advanced laboratory course applying the concepts, methodologies, skills, and tradeoffs in designing and building engineering solutions to contemporary social issues that leverage computing systems. Co-requisites: CoE 165 Computer Organization and Embedded Systems II, and CoE 167 Computing Systems. 3 h (Lab) 1 u.
- 30. CoE 199 Special Projects in Computer Engineering.** Prerequisite: EEE 196 Undergraduate Colloquium. 9 h (Lab) 3 u.

ECE Courses

- 31. ECE 161 Digital Signal Processing.** Mathematical methods for analyzing discrete-time signals and systems; design and implementation of linear time-invariant discrete-time systems. Prerequisite: EEE 147 Signals and Systems. 3 h (Lec) 3 u.

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- 32. ECE 163 Communications Electronics.** Analysis and design of circuits for communication systems. Prerequisites: EEE 131 Electronic Devices and Circuits, and EEE 157 Communication Systems and Networks. 3 h (Lec) 3 u.
- 33. ECE 164 Communications Circuits and Signal Processing Laboratory.** Circuits and signal processing for communication systems. Prerequisite: EEE 157 Communication Systems and Networks. 3 h (Lab) 1 u.
- 34. ECE 165 Digital Communication Systems.** Principles and practices of digital communications, modulation techniques, data link and physical layers, source and channel coding. Prerequisite: EEE 157 Communication Systems and Networks. 3 h (Lec) 3 u.
- 35. ECE 167 Computer Networks.** Principles and practices of computer networking, layered architecture and protocols, performance modelling and measurement, network security. Prerequisite: EEE 157 Communication Systems and Networks for EEEI students, Consent of Instructor for students who are not from the Electrical and Electronics Engineering Institute. 3 h (Lec) 3 u.
- 36. ECE 168 Network Communications Laboratory.** Infrastructure and techniques for reliable network communications. Prerequisite: EEE 157 Communication Systems and Networks. 3 h (Lab) 1 u.
- 37. ECE 199 Special Projects in Electronics Engineering.** Prerequisite: EEE 196 Undergraduate Colloquium. 9 h (Lab) 3 u.

EE Courses

- 38. EE 161 Introduction to Power Electronics.** Switching devices and converter circuits for the control, storage, and conversion of electric energy. Prerequisite: EEE 141 Electronic Circuits and Systems. 3 h (Lec) 3 u.
- 39. EE 163 Electrical Machines and Equipment.** Dynamics and control, overcurrent protection, and surge protection of motors and generators, power and distribution transformers, power capacitors, and power distribution circuits. Prerequisites: EEE 145 Electromechanical Energy Converters, and EEE 155 Introduction to Electric Power Systems. 3 h (Lec) 3 u.
- 40. EE 164 Power Electronics and Electric Machines Laboratory.** Electronic control and operation of electrical machines. characterization of electrical machines and transformers. Prerequisites: EEE

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145 Electromechanical Energy Converters, and EEE 141 Electronic Circuits and Systems. 3 h (Lab) 1 u.

- 41. EE 165 Electric Power Generation and Transmission.** Detailed power system operations and analyses. Various technology options in electric energy generation, storage, and transmission; including future directions. Prerequisite: EEE 155 Introduction to Electric Power Systems. 3 h (Lec) 3 u.
- 42. EE 167 Electric Energy Distribution and Utilization.** Residential, commercial, and industrial systems; demand-side management; distribution system modeling, planning and analysis; distributed energy resources. and smart grid technologies. Prerequisite: EEE 155 Introduction to Electric Power Systems. 3 h (Lec) 3 u.
- 43. EE 168 Electric Power System Laboratory.** Design and computer simulation of electric power systems from generation and transmission systems to distribution and utilization. Prerequisite: EEE 155 Introduction to Electric Power Systems. 3 h (Lab) 1 u.
- 44. EE 199 Special Projects in Electronics Engineering.** Prerequisite: EEE 196 Undergraduate Colloquium. 9 h (Lab) 3 u.