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| **Course** | ECE 30100 - Signals and Systems |
| **Type of Course** | Required for the EE and CmpE programs |
| **Catalog Description** | Classification, analysis and design of systems in both the time- and frequency-domains. Continuous-time linear systems: Fourier Series, Fourier Transform, bilateral Laplace Transform. Discrete-time linear systems: difference equations, Discrete-Time Fourier Transform, bilateral z-Transform. Sampling, quantization, and discrete-time processing of continuous-time signals. Discrete-time nonlinear systems: median-type filters, threshold decomposition. System design examples such as the compact disc player and AM radio. |
| **Credits** | 3 |
| **Contact Hours** | 3 |
| **Prerequisite Courses** | ECE 20200 |
| **Corequisite Courses** | None |
| **Prerequisites by Topics** | An understanding of basic concepts of linear circuits as examples of linear systems; an understanding of the application of unilateral Laplace transforms to circuit problems; a familiarity with the solution of linear constant coefficient differential equations; a familiarity with complex numbers and calculus, including power series. |
| **Textbook** | *Linear Systems & Signals*, by B. P. Lathi and Roger Green, The Oxford Series in Electrical & Computer Engineering, 3rd Ed., 2017 |
| **Course Objectives** | Give junior students in electrical engineering an introduction to the analysis of both continuous and discrete time signals and systems. |
| **Course Outcomes** | Students who successfully complete this course will have demonstrated:1. An ability to classify signals and systems (1).
2. An ability to use convolution to determine the time-domain response of continuous-time systems (1).
3. An ability to represent continuous-time signals by their Fourier series (1).
4. An ability to analyze continuous-time signals and systems by Fourier Transform (1).
5. An ability to analyze continuous-time systems by Laplace transform (1).
6. An ability to understand sampling and quantization (1).
7. An ability to use convolution to determine the time-domain response of discrete-time systems (1).
8. An ability to represent discrete-time signals by their discrete-time Fourier series (1).
9. An ability to analyze discrete-time signals by discrete-time Fourier Transform (1).
10. An ability to analyze discrete-time systems by z-transform (1).
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| **Lecture Topics** | 1. Classification of signals and systems
2. Signal operations—time shifting, scaling, inversion
3. Continuous-time impulse response and convolution
4. Laplace transform and its applications, transfer functions
5. Orthogonal representation of signals and Fourier Series
6. Fourier transform and its applications
7. Time-domain solution of difference equations
8. Discrete-time impulse response and convolution
9. Discrete-time Fourier series
10. Discrete-time Fourier transform and its properties
11. Sampling and quantization
12. Discrete Fourier transform
13. z-Transform and its applications
14. System design examples
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| **Computer Usage** | Medium |
| **Laboratory Experience** | None |
| **Design Experience** | None |
| **Coordinator** | Elizabeth Thompson, Ph.D.  |
| **Date** | 8/20/2024 |