JOINT INSTITUTE
交大密西根学院

Standard Undergraduate Course Profile

COURSE NUMBER: Ve216	**COURSE TITLE:** Introduction to Signals and Systems
CREDIT: 4	**PREREQUISITES:** Ve215 and Vv156
TEXTBOOKS/REQUIRED MATERIAL: Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, "Signals and Systems", Second Edition, 1997, Prentice Hall	**PREPARED BY:** Yong Long and Chong Han **LAST UPDATED:** August 16, 2020 **DATE OF DISCIPLINE GROUP APPROVAL:** **DATE OF UC APPROVAL:**
CATALOG DESCRIPTION (No more than 100 words): This course introduces students to basic concepts in continuous-time linear system theory. The analysis of continuous-time systems is considered in both the time and frequency domains. Topics include linearity, impulse response, convolution, frequency response, filtering, Fourier series, Fourier transforms, sampling theorem, relationship between continuous-time and discrete-time systems (as time perm its), Laplace transforms, system transfer function, poles and zeros, stability. Applications of these techniques will be discussed using examples from circuits, signal processing, communication and control. Weekly recitations and hardware and software laboratories will also be included in this course.	**COURSE TOPICS:** 1. Continuous-time signals and systems 2. Continuous-time linear time-invariant (LTI) systems and convolution 3. Frequency response and filtering of signals 4. Fourier series 5. Fourier transforms 6. Sampling theorem 7. Basics of analog communications 8. Basics of feedback control 9. Laplace transform and poles and zeros
COURSE STRUCTURE/SCHEDULE: Two 90-minute lectures/week; Six 90-minute discussions; Six or more recitation classes; Three 120-minute labs	
COURSE OUTCOMES [Student Outcomes* in brackets] *for each course outcome, links to the Student Outcomes are identified in brackets.*	After completing Ve216, students should be able to do the following: 1. Classify continuous-time signals and systems. [1] 2. Compute convolution integral. [1] 3. Solve linear constant coefficient differential equations.[1] 4. Compute two continuous-time Fourier representations: Fourier Series and Fourier transform.[1] 5. Compute Laplace transform. [1] 6. Analyze continuous-time LTI systems in both time and frequency domain. [1, 6, 7] 7. Analyze continuous-time LTI systems in s-domains. [1, 6, 7] 8. Analyze RLC circuits in frequency domain and s-domains. [1, 6, 7] 9. Analyze and design simple frequency-selective filters. [1, 6, 7] 10. Analyze simple A/D converter (sampling) systems. [1, 6, 7] 11. Analyze simple communication systems. [1, 6, 7] 12. Analyze simple linear feedback systems. [1, 6, 7]
COURSE OBJECTIVES [Course Outcomes in brackets] *for each course objective, links to the course outcomes are identified in brackets.*	1. To acquaint students with the basic concepts and properties of continuous-time signals and systems. [1] 2. To teach students how to analyze continuous-time LTI systems in the time-domain. [2, 3] 3. To teach students how to use Fourier representations and Laplace transforms for spectral analysis. [4, 5] 4. To teach students how to use transfer functions and frequency response to analyze and design filters. [6, 7, 8, 9] 5. To introduce students to, and stimulate interest in, communications, control and signal processing. [10, 11, 12] 6. To prepare students for follow-up courses in the systems area of the Electrical and Computer Engineering program. [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12]
ASSESSMENT TOOLS [Course Outcomes in brackets] *for each assessment tool, links to the course outcomes are identified*	1. Homework [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12] 2. Hardware and software labs [3, 6, 7, 8, 9, 10, 11, 12] 3. Closed-book exams [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12]

ABET Student Outcomes* —— Apply to Engineering, Math, and Science Courses Only

1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

3) an ability to communicate effectively with a range of audiences

4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies