

# ECE 351 – Signals & Systems I

**Catalog Description:** Analytical techniques for continuous-time and discrete-time signal, system, and circuit analysis.

**Credits:** 3                    **Terms Offered:** Fall, Winter

**Prerequisites:** ENGR 203, MTH 256

**Courses that require this as a prerequisite:** ECE 352, ECE 353, ECE 431, ECE 441, ECE 451, ECE 461, ECE 462, ECE 463, ECE 464, ECE 468, ECE 550

**Structure:** Three 50-minute lectures per week

**Instructors:** H. Liu (primary), T. Nguyen (secondary)

## Course Content:

- Matlab skills (using help and basic commands, program using vectors & matrices)
- Basic concepts of continuous- and discrete-time signals and systems.
- Time-domain analysis of linear time-invariant (LTI) continuous-time (CT) and discrete-time (DT) systems.
- Frequency-domain analysis of CT/DT signals and LTI systems.

## Measurable Student Learning Outcomes:

At the completion of the course, students will be able to...

1. **Derive** linear models of simple electrical circuits (effective use of differential equations) (ABET: Outcomes A, k, M, N)
2. **Analyze** linear time invariant system responses in time domain using the convolution. (ABET Outcomes: A, K, M, N)
3. **Analyze** continuous time signals and systems in the frequency domain using the Fourier Transform. **Determine** the Frequency Spectrum of periodic and aperiodic signals using the Fourier Series and Fourier Transform, respectively (ABET Outcomes: A, K, M, N)
4. **Apply** the basic properties of CT and DT signals and systems; **express** physical signals as mathematical functions, including use of standard signals; **use** computers and MATLAB to simulate and analyze signals and systems; **determine** if a system is linear, time-invariant, causal, and memoryless (ABET Outcomes: A, B, K, M, N)

## Learning Resources:

- Simon Haykin and Barry Van Veen, *Signals and Systems*, Second Edition, Wiley, 2003, ISBN 0471-16474-7 (required)
- MATLAB text: William Palm, *Introduction to MATLAB 7 for Engineers*, McGraw-Hill, 2006 ISBN 0-07-2548185 (recommended)
- A.V. Oppenheim and A.S. Willsky, *Signals and Systems*, Second Edition, Prentice Hall, 1997, ISBN 0-13-814757-4 (reference)

- C.L. Phillips and J.M. Parr, *Signal, System, and Transforms*, Second Edition, Prentice Hall, 1991, ISBN 0-20-109589-0 (reference)
- D.K. Lindner, *Introduction to Signals and Systems*, First Edition, McGraw Hill, 1999, (Fourier transform reference)

**Students with Disabilities:**

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.

**Link to Statement of Expectations for Student Conduct:**

<http://oregonstate.edu/admin/stucon/achon.htm>

Revised: 5/21/07

Revised Content, CLOs, Learning Resources, and Students with Disabilities: 2/15/11

Revised: 8/15/14