

## EEE 203: Signals and Systems (Fall 2010)

Dr. Chaitali Chakrabarti  
GWC 418, ph: 965-9516  
email: chaitali@asu.edu

**Meeting Times:** ECG G347. Mon and Wed: 2:00-3:15pm.

**Office hours:** Mon and Wed 12:30-1:30pm in GWC418, Tue: 1:00-2:00pm in GWC 411C.

**Textbook:** A. V. Oppenheim and A. S. Willsky with H. Nawab, *Signals and Systems*, 2nd edition, Prentice Hall 1997.

**Website:** ASU BlackBoard <http://myasucourses.asu.edu/>

**Software:** MATLAB, signal processing toolbox.

### Supplementary materials:

- Schaum's series *Signals and Systems*, McGraw Hill.
- A. D. Poularikas and S. Seely, *Signals and Systems*, 2nd edition. PWS-Kent Publishing Company, 1991.
- E. Kamen and B. Heck, *Fundamentals of Signals and Systems: Using the Web and MATLAB*. Prentice Hall, 2000.
- S. S. Haykin and B. Van Veen, *Signals and Systems*. John Wiley, 2003.
- B.P. Lathi, *Linear Systems and Signals*, 2nd edition. Oxford University Press, 2005.
- C. Chen, *Signals and Systems*, 3rd edition. Oxford University Press, 2004.

**Prerequisites:** Electrical Networks (EEE 202), Linear Algebra (MAT 342, or 343) (co-requisite)

**Catalog Description:** Introduction to continuous and discrete time signal and system analysis, linear systems, Fourier and Z transforms.

## Course Objectives and Outcomes:

- Understand time-domain properties of continuous-time (CT) and discrete-time (DT) signals and linear time-invariant (LTI) systems
  - give examples and plot CT and DT signals, and realize transformations of the time variable
  - deduce linearity, time-invariance, and causality from a system input/output equation
  - obtain block diagrams from input-output equations
  - obtain the impulse response of a system from either a system equation or block diagram
  - use convolution (graphical or analytical) to obtain the output of an LTI system
  - write transfer functions from differential equations
- Understand the Fourier transform in CT/DT signal analysis
  - calculate the Fourier transform (FT) and inverse FT of simple signals
  - use FT properties to determine the FT of a transformed signal
  - sample a CT signal to obtain a DT signal
  - compute the z-transform and DT FT of DT signals
  - use FFT in MATLAB to compute FT
- Understand fundamental frequency domain properties of CT and DT LTI systems
  - obtain the frequency response of an LTI system and plot its magnitude and phase.

## Course outline:

During the semester, we will cover the following topics:

- **Signals:** (ch. 1) continuous-time and discrete-time; unit step, unit impulse, exponentials, sinusoids; transformations of the time variable.
- **Systems:** (ch. 1, 2) linearity; time-invariance; causality; stability; impulse response; eigenfunctions; system properties; LTI systems; convolution; differential equations; block diagrams.
- **Fourier series:** (ch. 3) periodic signals; Fourier series definition and examples.
- **Fourier transform:** (ch. 4) FT definition and examples; convergence; frequency response of LTI systems.
- **Discrete-time Fourier transform:** (ch. 5) DTFT definition and examples; properties.
- **Sampling:** (ch. 7) sampling theorem; reconstruction.
- **z-transform:** (ch. 10) definition, examples, properties, region of convergence.

**Grading:** The plus/minus grading system will be used. The distribution of marks is as follows.

Exam 1 (Sep 22)	15%
Exam 2 (Oct 20)	20%
Exam 3 (Nov 22)	20%
Final exam (Dec 13)	30%
Homework	15%

**Other information:**

- The homework assignments will be posted on the class web page. There will be around 9-10 homework assignments; the lowest score will be dropped. Homework is to be turned before the start of class on the due day. Late submissions will not be allowed. Students may work together on the homework, but copying is unacceptable.
- All exams will be closed book and closed notes. You will be allowed to use a calculator and a cheat-sheet. You will be severely reprimanded if you are caught cheating. There will be no make-up exams.
- There will be a problem solving session every Tuesday from 1:00-2:00pm in GWC 411E. This is not mandatory but please try to attend.