

Syllabus for ECE2311
Continuous-Time Signal and System Analysis
D Term, 2010

Instructor: Prof. D. Richard Brown III

- Office: Atwater Kent 313
- Office hours: Mondays 1–3pm.
- email: drb@wpi.edu

Teaching Assistant: Umair Khan

- Help session hours: Thursdays 2–4pm
- email: uikhan@wpi.edu

Senior Tutor: Yizheng Liao

- Help session hours: Mondays 4–6pm
- email: liaoyizheng@wpi.edu

Class Meets:

AK233, MTWRF 10:00–10:50am, Mar 15 – May 04 but not Apr 19 (Patriots Day) or Apr 22 (Project Presentation Day).

Quizzes and Examination Schedule:

- Quizzes will be held on the following Fridays: Mar 26, Apr 2, Apr 9, Apr 16, Apr 23, Apr 30. Each quiz will be based on the material covered in the previous week and assigned in the previously submitted homework assignment.
- A comprehensive final exam will be held on Tuesday May 4.

Course Description (from the WPI Catalog):

This course provides an introduction to time and frequency domain analysis of continuous time signals and linear systems. Topics include signal characterization and operations; singularity functions; impulse response and convolution; Fourier series; the Fourier transform and its applications; frequency-domain characterization of linear, time-invariant systems such as filters; and the Laplace transform and its applications.

Recommended background: ECE 2111, MA 1022.

Suggested background: MA 2051.

Expected Course Outcomes:

Students who successfully complete this course should be able to:

1. Characterize and describe signals and systems using commonly accepted terminology.
2. Relate frequency-domain descriptions of signals and systems to their characteristic in the time domain and vice-versa.
3. Use frequency-domain techniques to solve input/output problems for linear, time-invariant systems.
4. Use computer software tools to model signals and systems and to solve problems.

Expected Background:

Students taking ECE2311 should have a basic understanding of integral and differential calculus, as well as basic RLC circuit analysis, transient analysis, and phasor analysis. A familiarity with differential equations may also be helpful.

Required Textbook:

- *Linear Systems and Signals*, B.P. Lathi, Second Edition, Oxford University Press.

If you find Lathi to be unsatisfactory, the WPI library has dozens of other books on this subject. I highly recommend perusing other signals and systems texts for examples and alternative explanations of the topics covered in this course.

Course Web Page and Announcements:

The official web page for this course is:

http://spinlab.wpi.edu/courses/ece2311_2010/

All course materials including homework assignments, their solutions, any announcements, and useful links will be made available here.

Important course announcements such as schedule changes will be sent via the course email distribution list:

ece2311@ece.wpi.edu

Grading, Exams, Lab Reports, and Homework Policy:

6 homework assignments	20%
6 quizzes	60%
Comprehensive final exam	20%
Total	100%

Quizzes and exams are open-book and open-notes. You may also bring a calculator to the quizzes and exams, although it won't always be necessary.

Late Policy:

Homework assignments are due by the end of lecture (10:50am) on its due date. Turning in late work is highly discouraged. If you must turn an assignment in late, the following penalties will be assessed:

- Homework assignments:
 - 0-24 hours late: -20%
 - 24-48 hours late: -40%

No homework assignments will be accepted more than 48 hours late.

- Quizzes and examinations: Please refer to the ECE2311 academic honesty policy on the course web page regarding makeup examinations.

Tentative Course Schedule:

Meeting	Date	Topics
1	3/15	Course introduction.
2	3/16	Sinusoidal signals. Phase shift. Time shift. Pullback.
3	3/17	Properties of systems: linearity, time-invariance, causality, dynamic/instantaneous.
4	3/18	Sinusoidal inputs to LTI systems.
5	3/19	Properties of signals: periodic/aperiodic, energy/power,
6	3/22	Useful functions: unit step, unit impulse. Impulse and step response.
7	3/23	Convolution integral. HW1 due.
8	3/24	Properties of convolution.
9	3/25	Fourier series of periodic signals.
10	3/26	Quiz 1.
11	3/29	Techniques for computation of the Fourier series.
12	3/30	Other representations of the Fourier series. HW2 due.
13	3/31	Fourier series examples.
14	4/1	Applications of the Fourier series.
15	4/2	Quiz 2.
16	4/5	Fourier transform of aperiodic signals.
17	4/6	Fourier transform examples. HW3 due.
18	4/7	Properties of the Fourier transform. The sinc function.
19	4/8	More properties of the Fourier transform.
20	4/9	Quiz 3.
21	4/12	Time-frequency duality.
22	4/13	Examples. HW4 due.
23	4/14	Frequency shift property. Time shift property.
24	4/15	Amplitude modulation and demodulation.
25	4/16	Quiz 4.
26	4/20	Laplace transform. HW5 due.
27	4/21	Properties of the Laplace transform.
28	4/23	Quiz 5.
29	4/26	Using the Laplace transform to solve differential equations.
30	4/27	Transient circuit analysis. HW6 due.
31	4/28	Stability analysis.
32	4/29	An introduction to sampling and discrete-time signals and systems.
33	4/30	Quiz 6.
34	5/3	Review and examples.
35	5/4	Comprehensive final exam.

END OF SYLLABUS