Signal Processing (ENGG*3390)

School of Engineering, University of Guelph

Fall 2012

Instructor:

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Lab Technician:

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Course Schedule:

Lectures:

ROZH, Room 102

Mon, Wed, Fri 8:30 AM - 9:20 AM

Labs:

THRN, Room 2307

Mon 1:30 PM – 3:20 PM

Tues 9:30 AM – 11:20 AM

Tues 3:30 PM – 5:20 PM

Prerequisites

Topics:

Success in this course requires a good understanding of the fundamentals of engineering mathematics (trigonometry, linear algebra, complex numbers, infinite series, calculus, and differential equations). Knowledge about electric circuits and the physics of waves is helpful but not required.

Courses:

ENGG*2400

Note: You may be removed from this course if you do not have the correct prerequisites.

Course Description:

This course will establish the fundamental analysis and design techniques for signal processing systems. Topics covered include: definition and properties of linear time-invariant systems; impulse response and convolution; continuous time Laplace transform, Fourier series, Fourier transform; discrete-time Fourier transform, discrete-time Fourier series, fast Fourier transform, Z transform; complex frequency response; filter analysis and design for both continuous and discrete time systems. Students will be able to design continuous-time filters and both design and implement discrete-time digital filters using computer-based tools.

Course Objectives:

Students who complete this course should be able to:

- Understand the mathematical representations of continuous-time and discrete-time signals.
- Define the various continuous-time and discrete-time signal transforms (e.g. Laplace transform, Fourier transform and Z transform).
- Design both analog and digital electronic filters to enhance signal quality; enumerate the advantages and disadvantages of filter types; evaluate their general frequency response, and design specific filters to meet performance requirements.
- Apply the above transforms and design techniques to real systems and applications.
- Use computer-based signal processing tools.

Materials:

Textbook

J. H. McClellan, R. W. Schafer, M. A. Yoder, **Signal Processing First**, Pearson Prentice Hall 2003.

References

S. Haykin, B. Van Veen, **Signals and systems**, 2nd edition, Wiley 2005.

B. Daku, Matlab tutor CD: **Learning Matlab superfast**, Wiley 2005.

Major Topics

Signals, systems, and signal processing. Linear time-invariant systems. Fourier representation for signals. Frequency domain processing. Discrete-time Z transform. Filter analysis and design for continuous and discrete time systems.

Course Evaluation:

- ENGG*3390 is a 0.5 credit course
- **Lab marks 40%**

Lab 1 (20%)	Demo 10%, Report 10%
Lab 2 (20%)	Demo 10%, Report 10%

- **Exam marks 60%**

Midterm (20%)	TBA
Final (40%)	Tues, Dec. 4, 2012 (7:00 PM – 9:00 PM)

- **Missed exam**: a formal written explanation must be made to the instructor as soon as possible. Otherwise, exams will receive a grade of zero.
- **Late report**:
  - 25% will be deducted if report is up to 24 hours late.
  - 50% will be deducted if report is up to 48 hours late.
  - No reports will be accepted after that.

Tentative Schedule:

Weeks		Topics
1	3 – 7 Sep	Course Introduction
2	10 – 14 Sep	Sinusoids
3	17 – 21 Sep	Spectrum representation
4	24 – 28 Sep	Sampling and aliasing
5	1 – 5 Oct	FIR filters
6	8 – 12 Oct	Frequency response of FIR filters
7	15 – 19 Oct	z-transforms
8	22 – 26 Oct	IIR filters
9	29 Oct – 2 Nov	Continuous-time Signals and LTIS
10	5 – 9 Nov	Frequency response of LTIS
11	12 – 16 Nov	Fourier transform
12	19 – 23 Nov	Fourier transform (continued)
13	26 – 30 Nov	Review
14	4 Dec	Exams

Important Notes:

- Labs start on Monday September 17th, 2012.
- The lab mark for each group member depends on his/her performance within the group.
- Students must sign the "Work Evaluation Form" and submit it to the TA.
- Communications regarding the course involve class announcements, the course webpage (CourseLink) and the email. Please check them regularly.

University Policy on Academic Misconduct:

Academic misconduct, such as plagiarism, is a serious offence at the University of Guelph. Please consult the Undergraduate Calendar 2012-2013 and School of Engineering programs guide, for offences, penalties, and procedures related to academic misconduct.

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/

Disclaimer:

The instructor reserves the right to change any or all of the above (lab schedules, due dates, exam dates, marking schemes, etc.) in the event of appropriate circumstances, subject to the University of Guelph Academic Regulations.

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