Carleton University  
Department of Systems and Computer Engineering  
SYSC 5602 W: Digital Signal Processing  
Winter 2017  
Course Syllabus

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Office: ME 4480 Office Hours: Wed 6-7 PM (or by appointment)

Course Description and Objectives:  

Prerequisites:  
A good knowledge of the continuous-time Fourier transform, Laplace transform, impulse response, frequency response, and probability and statistics, as well as a basic understanding of computer architecture. Understanding of discrete-time Fourier transforms, sampling, and basic digital signal processing an asset.

Textbook (not mandatory):  

CU Learn will be used as the course webpage. All Announcements, assignments, and additional materials will be posted on CU Learn. CU Learn is accessible at http://culearn.carleton.

Grading:  
Assignments: 25%  
Midterm Test: 25% (Nov 1 or Nov 4, 2017, tbd)  
Final Examination: 50% (Scheduled Exam)

1. To obtain a final grade higher than F, students must obtain a passing grade on the final exam.  
2. Under cases where revaluation of midterm needs to be done, it would be performed without student’s presence.  
3. The web page will list your official assignment, midterm grades throughout the semester.  
4. It is your responsibility to double check that the grades are recorded correctly for your work.  
5. Check the course web page regularly for announcements and postings.  
6. Use of cell phones is strictly prohibited during lectures/exams/quizzes/tests/labs.  
7. Final Exam and Midterm will be closed book. Duration of final exam will be 3 hours. Only non-programmable calculating devices will be allowed.  
8. No Cheat sheets will be allowed in the midterm or final exam. If there are changes to this policy during the semester, then it will be announced in the class, especially before the midterm or the final exam.  
9. Late Assignments will not be evaluated.  
10. Midterm may be in-class or out of class hours depending on the availability of the class room. An announcement to this effect will made as soon details of room are available.  
11. Extra classes may be held outside the prescribed hours whenever needed. Announcement will be made in advance in the class as and when required.
Midterm Policy:
Midterm will be administered outside the class hours, if suitable class rooms are unavailable to conduct in-class exams. Date, time and place will be announced in the class and posted on CU Learn. A missed midterm will be recorded as a zero. If the midterm is missed for circumstances beyond your control, you should submit appropriate documentation within 5 business days after the midterm for consideration. If valid documentation is provided, then midterm exam will be administered.

Final Exam Policy:
The final exam is for evaluation purposes only and will not be returned to the student.

Plagiarism:
Plagiarism (copying and handing in for credit someone else’s work) is a serious instructional offence that will not be tolerated. Also, any work produced for this course is expected to be your individual work and submission of collaborative work is not permitted. Please refer to the section on academic integrity in the Graduate Calendar for additional details and refer to the Academic Integrity Policy.

Material Copyright:
Student or professor materials created for this course (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).

Course Content:
Time permitting, the following topics will be covered:
- Review of discrete-time signals and systems
- Representation in time, frequency, and z-domains
- Impulse response, frequency response
- Shannon sampling theorem, Nyquist rate
- z-transform, region of convergence, inverse z-transform
- Linear discrete-time convolution
- Pole-zero diagrams, stability, causality
- Generalized linear phase filters, group delay
- Frequency selective filters, ideal filters, digital resonators, nulling filters, comb filters
- All-pass, minimum-phase, and maximum-phase filters
- z-domain ,frequency domain relationship
- Discrete Fourier transform (DFT), fast Fourier transforms (FFT)
- FIR filter design, Gibbs’ phenomenon
- Windowing, Kaiser filter design
- Equiripple FIR filers, Parks-McClellan filter design
- IIR filter design, impulse invariance, bilinear transformation
- Filter structures, quantization effects
- Picket fence effect, spectral leakage, frequency resolution
- Circular convolution, linear filtering with DFT, overlap-add and overlap-save methods
- Random signals, correlation functions, system identification
- Multi-rate signal processing, digital-to-digital rate conversion, decimation, interpolation, polyphase realizations
- Power spectrum estimation, periodogram, Bartlett method, Welch method, Blackman-Tukey method
- Introduction to joint time-frequency analysis, spectrograms
- MATLAB/Octave implementations
Health and Safety information: Here is the link to the health and safety manual:
www.sce.carleton.ca/courses/health-and-safety.pdf

Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy/parental leave obligation:

Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: http://www.carleton.ca/equity/accommodation/academic/

Religious obligation:

Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: http://www.carleton.ca/equity/accommodation/academic/

Academic Accommodations for Students with Disabilities:

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable): http://www.carleton.ca PMC/students/dates-and-deadlines/