ECSE 306 - Fall 2008
Fundamentals of Signals and Systems
McGill University
Department of Electrical and Computer Engineering

Course Description:

Review of complex functions. Discrete-and continuous-time signals, basic system properties. Linear time-invariant systems, convolution. Fourier series and Fourier transforms, frequency domain analysis, filtering, sampling. Laplace transforms and inversion, transfer functions, poles and zeros, solutions of linear constant-coefficient differential equations, transient and steady state response. Z-transforms **(3-2-4)**

Prerequisites: ECSE 210 and MATH 270 or MATH 271.

Instructor:

Dr. Hui Qun Deng Office: ENGTR4103	Office Hours: 6:30-8:00 pm (Thursday)

Teaching Assistant and Graders

TA:	Hussam Al Maleh	hussam.al_maleh@mail.mcgill.ca
Grader 1	Aarthi Mallam Reddy	aarthi.reddy@mail.mcgill.ca
Grader 2		

Lectures and Tutorials:

Lectures	Sep. 2- Dec.2	MWF	10:35 – 11:25	ENGTR 1100
	Dec. 2	T	10:35 – 11:25	ENGTR 1100
Tutorials	Sep. 8 – Dec. 7	Weekly	See time from webCT	See room from webCT
First Lecture: September 3		*Last Lecture: December 2*		
Thanksgiving day October 13 (Mon)				

Textbooks:
Required Text:
B. Boulet, Fundamentals of Signals and Systems, Da Vinci Engineering Press, Charles River Media, 2006.

Suggested Text:
A. V. Oppenheim, A. S. Willsky, and S. H. Nawab, Signals and Systems, 2nd Eddition. Prentice Hall, New Jersey, 1997

Course Website:

All course materials will be available through the ECSE306 webCT Vista website. This includes this syllabus, lecture slides, assignments, solutions, tutorials, and other materials. If you need to contact me, please use the webCT email system. I will try and respond within 24 hours during the week and within 48 hours on the week-end.

Academic Integrity:

Senate on January 29, 2003 approved a resolution on academic integrity, which requires that the following reminder to students be printed on every course outline:

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism, and other academic offenses under the code of student conduct and disciplinary procedures (see http://www.mcgill.ca/integrity for more information)

Grading:

Assignments	Weekly	10%
Midterm 1	Sep. 29 (M)	20%
Midterm 2	Nov. 5 (W)	20%
Final	Examination Period (Dec. 7 – Dec. 22)	50%

Assignments:

Assignments provide students with the tests of their understanding and applying the concepts and theories of this course. Grading is important for both the teacher and students to know how well the students master the subjects. Solutions will be posted after the due time of assignments.
Assignments will be posted on the ECSE306 WebCT site on a weekly basis, for the most time.
Each assignment will be due in one week from the day it is posted.
A portion of the assignments will involve the use of MATLAB to implement and illustrate solutions and concepts. Source code, plots, and results must be submitted with the assignment.
Assignments should be done based on independent thinking, while discussions with classmates and self-learning are strongly encouraged.
Submitted assignments should be HANDWRITTEN and include the steps showing how the answers are derived.
Assignments identified as copies of other's will be graded as zero points.
Assignments submitted later than due time will be graded as zero points.
The assignment box is located next to the Trottier Undergraduate Office, Room 2060, near the stairway.

Midterm Examination:
There will be two midterm examinations, each with 1 hour 50 minutes in duration. This will be a **closed book** exam. You will be allowed one 8.5" x 11" crib sheet (**hand-written** only, both sides) and the use of the faculty standard calculator.

Final Examination:
There will be a final examination, 3 hours in duration, with the date and time of the exam to be announced by the Faculty. This will be a **closed book** exam. You will be allowed two 8.5" x 11" crib sheets (**hand-written** only, both sides) and the use of the faculty standard calculator.
The final exam will cover all the material included in the class notes and/or seen in the class during the whole term.

Marking Policy (Assignments and Midterms):

No assignments will be accepted after due time.
Marked assignments not picked up within two weeks may be discarded.
There will not be any make-up examinations for students who miss a midterm examination.
Students who miss a midterm exam due to illness should notify the instructor within a week of the examination and provide her with an adequate medical certificate stating the date and nature of the illness.
Only after presentation of a proper medical certificate will the mark for the missed examination be computed from mark obtained from the final examination.
Students who miss the midterm exam for unjustified reasons will automatically receive a mark of 0 for the exam.
Any request for reevaluation of a midterm exam must be made by the end of the class where it is returned to the students by contacting the instructor.
Marked midterm exams not been picked up after two weeks may be discarded.

ECSE 306 Course calendar and topics

Date	Lectures	Topics	Tutorials and QA	**Assignments (10%)**
Sep. 3 (W)	1	Course administrative details, CT and DT signals and systems, transformation of time variables, properties of signals		
5 (F)	2	CT and DT exponential, harmonics, unit step, and unit impulse signals		
8 (M)	3	Properties CT and DT impulse and step functions and their relations to other signals	1 QA	A1 posted
10	4	System models, properties of systems		
12	5	Properties of LTI systems, convolution of DT signals		
15(M)	6	Convolution of CT signals	2 QA	A2 posted, A1 due
17	7	Differential and difference LTI systems		
19	8	Fourier series		
22 (M)	9	Gibbs Phenomena, properties of FS (linearity and time shifting)	3 QA	A3 posted, A2 due
24	10	FS of sinc(x), sinc(n), response of LTI to periodic signals (Filtering), Parseval's TH		
26	11	FS of impulse train …		
29 (M)		**Midterm 1 (20%)**	QA	A3 due
Oct. 1 (W)	12	CT FT, comparison of FS and FT, properties of FT, Parseval's relation		
3	13	Inverse FT		
6 (M)	14	FT in solving CT differential systems (equations), filters	4 QA	A4 posted
8	15	CT LP, BP, HP Filters		
10	16	Laplace Transform, ROC, properties of BLT, inverse LT		
13 (M)		*Thanks Giving Day*	5 QA	
15 (W)	17	Inverse LT, initial and final value THs, unilateral LT		A5 posted, A4 due
17	18	Stability and causality of LTI using LT		
19 (M)	19	Poles and zeros of transfer functions, causality, stability	6 QA	
22 (W)	20	Stability analysis of TF using LT. Time and frequency analysis of BIBO CT LTI systems using poles and zeros		A6 posted, A5 due
24	21	Frequency analysis using poles and zeros		
27 (M)	22	Bode Plots, dB	7 QA	
29 (W)	23	Bode plots of 1st order lag and 2nd order lag systems		A7 posted, A6 due
31	24	Step responses of LTI systems; non-minimum phase system s		
Nov. 3 (M)	25	minimum phase, all-pass systems		
5 (W)		**Midterm 2 (20%)**	QA	A7 due
7	26	Discrete-time Fourier Series		
10 (M)	27	DT FS	8 QA	
12 (W)	28	Properties of DT FS, periodic convolution		A8 posted
14	29	FT of DT		
17 (M)	30	z-transform, ROC, properties of two-sided z-Transform	9 QA	
19 (W)	31	Inverse ZT: partial fraction, transfer functions of DLTI systems, causality, stability, DT filters		A9 posted, A8 due
21	32	LPF, BPF		
24 (M)	33	FIR, IIR, moving average filters	10 QA	
26 (W)	34	Sampling, Nyquist TH, signal reconstruction, aliasing, anti-aliasing filter,		A10 posted, A9 due
28	35	application examples		
Dec. 1 (M)	35	Review	QA	
2 (T)	36	Review		A10 due
TBD		**Final Exam (50%)**		