ECE 2704 – Signals and Systems
Spring 2006

Course:	CRN 11752	MW 2:30-3:45	WHIT 349
Instructor:	Dr. R. Michael Buehrer	433 Durham Hall	231-1898
Office Hours:	MW 9-10, T 10-12		
GTA:	Jaime Torres Whit. 266	jatorres@vt.edu Office Hours: MW 11-2, TR 2-3, F 9-12	
Textbook:	M.J. Roberts, Signals and Systems, McGraw-Hill, 2004. *Matlab* will also be required and is available at the bookstore or www.computing.vt.edu.		
Prerequisites:	ECE 2004 AND MATH 2214		
Website:	http://www.mprg.org/people/buehrer/2704/ece_2704.htm		

Grading:	Homework	10%	Quizzes	10%
	Three midterms	50%	Final	30%

Course Objectives: The main objective of this course is to develop analysis techniques for signals and systems. To do this we will specifically study signal representation, including Fourier and Laplace transforms and system definitions and properties, such as linearity, causality, time invariance, and stability. Specific techniques that will be studied include the use of convolution, transfer functions and system frequency response to determine the output of a system based on the input. These topics are fundamental to all of engineering but are absolutely vital to the fields of communications, signal processing, electro-magnetics, controls and electronics.

Homework: Homework assignments will be given regularly (typically weekly) with each assignment consisting of 5-10 problems. The object of these assignments will be to help the student verify that he/she understands the basic concepts presented in class and *to provide the student the opportunity to obtain a deeper understanding of the material*. The grading will be as follows: 2/2 for a correct part to a problem, 1/2 for an incorrect answer but valid attempt, and 0/2 for no meaningful attempt. The lowest HW grade will be dropped. The homework assignments and due dates are posted on the website. It is the student's responsibility to check the website for the assignments. The due dates are already posted and the assignments will be posted at least one week prior to the due date.

Exams: There will be four exams, three midterms and a final. All will be in-class exams. The three mid-terms constitute 50% of your course grade. Specifically, your highest exam score will be weighted 25%, the middle exam score will be weighted 15% and the lowest midterm grade will be weighted 10%. The exam dates are already scheduled. It is your responsibility to be available for those dates. If you will be out of town, it's your responsibility to make arrangements to take the exam *before* the exam date. Illnesses will only be excused with a doctor's note.

Quizzes: Nearly every week there will be a short quiz. The quizzes will be simple (1 question) and will test basic understanding. Each quiz will be worth 10 points. Your lowest quiz grade will be dropped.

Honor Code: All work submitted for tests and exams must be your own work. You should sign the honor pledge on the exam: "I have neither given nor received unauthorized assistance on this assignment." You may confer with your colleagues on interpretation and approach to homework and project problems, but the solution should then be your own. All external research of the design projects should be documented through citation of references in a manner consistent with academic standards.

Accommodations: Any student who feels that he or she may need an accommodation because of a disability (learning disability, attention deficit disorder, psychological, physical, etc.) should see me during office hours. Specific accommodation requests are handled by the Dean's Office and must be approved by that office.

Late Assignments: All assignments are due by the end of class on the due date. If you will be out of town, you must make arrangements to get me the assignment before the due date. *Late assignments will not be accepted!* Note, however, that I will drop your lowest homework grade.

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Syllabus

Week	Date	Lecture Topics	Reading
1	1/16	Introduction, Course Overview	Chapter 1
2	1/23	Definition of Signals	Chapter 2
		Definition of Systems	Sections 3.1-3.4
3	1/30	Convolution Intregral	Section 3.6
4	2/6	Introduction to the Fourier Series	Sections 4.1-4.3
5	2/13	**Midterm Exam I (2/13)**	
		Fourier Series – Properties and Examples	Sections 4.3-4.4
6	2/20	The Fourier Transform – Introduction, convergence and properties	Sections 5.1-5.5
7	2/27	The Fourier Transform – Properties and Examples	Section 5.5
8	3/13	Applications of The Fourier Transform: Frequency response and impulse response Ideal filters	Section 6.1-6.3
9	3/20	**Midterm II (3/20)**	Sections 6.4-6.6, 6.9
		Application of the Fourier Transform: Filters, log-magnitude plots, bode plots, communications examples	
10	3/27	Correlation, Energy Spectral Density and Power Spectral Density	Sections 8.1-8.5, 8.7, 8.8
		Introduction to the Laplace Transform	Sections 9.1-9.3
11	4/3	Properties of the Laplace Transform	Sections 9.3-9.4
		Inverse Laplace Transform using partial fraction expansion	
12	4/10	Using the Laplace Transform: solving differential equations	Sections 9.5-9.7
		Relationship between the LT and the FT	
		Applications of the Laplace Transform: Transfer functions	Sections 10.1-10.2
13	4/17	**Midterm III (4/17)**	
		Applications of the Laplace Transform: stability and feedback systems	Sections 10.3, 10.5
14	4/24	Applications of the Laplace Transform: System response and pole/zero diagrams	Sections 10.7, 10.8
15	5/1	Final Topics, Review for Final Exam	
	5/10	**Final Exam (10:05am – 12:05pm)**	