SM316 ENGINEERING MATH – PROBABILITY, TRANSFORMS & MATRIX THEORY, Spring Semester 2010

Textbooks:

(1) *Probability, Statistics, and Fourier Analysis*, Walpole, et al, Pearson Custom, 2008.
(2) *Matrix Operations*, R. Bronson, Schaum's Outline Series, McGraw-Hill, 1989.

At the start of the semester, your instructor will inform you of his/her policy regarding grading, homework, quizzes, tests, math tables and calculators. The final will be a common exam for the course. It is your responsibility to study the assigned sections and those problems assigned from the texts. The following table provides an *approximate* order of presentation of topics and homework questions to be considered. Each instructor may amend, reorder, or augment the lectures and problems listed below as the semester unfolds. The list of homework problems provides a reference for the level of questions present on the final examination.

Lesson	Section	Topic	Date	Problems
1	2.1, 2.2	Sets and Sample Spaces	01/12 (TUES)	p. 38 # 2.1, 2.2,2.3,2.4,2.14
2	2.2, 2.3	Events; permutations of distinct items	01/13	p. 38 # 2.8,2.15; p. 47 #2.21, 2.22,2.23
3	2.3, 2.4	Combinations of distinct items; Probability Axioms	01/15	p. 47 # 2.26, 2.30,2.32; p. 55 # 2.51, 2.52, 2.53
4	2.5, 2.6	Probability, Additive Rules, and Conditional Probability	01/20 (WED)	p. 47 # 2.50; p. 55 # 2.54,2.58, 2.60,2.65; p. 65 # 2.77, 2.78
5	2.6, 2.7	Conditional Probability, Tabular Venn Diagrams (TVD)	01/22	p. 65 #, 2.81, 2.86; p. 72 # 2.101,2.103
6	2.7, 2.8	Independence, Bayes' Thm by TVD	01/25 (MON)	p. 65 # 2.83, 2.94 p. 73 # 2.105,2.108

7	3.1, 3.2	Discrete RV's: Prob. Mass Funct (pmf) & CDF (unif/Binom as examples)	01/27	p. 88 #3.1, 3.2, 3.3, 3.5, 3.11
8	3.3	Continuous RV's: pdf & CDF (unif/Gaussian as examples)	01/29	p. 88 #3.12, 3.13, 3.7,3.9,3.14 (p. 185 #6.20, 6.21,6.22)
9	4.1	Mean of Discrete/C^0 RV; mean of functions of RV	02/01 (MON)	p. 88 #3.21,3.29; p. 113 #4.6,4.7,4.9; p. 113 #4.12,4.15, 4.17,4.20
10	4.2, 4.3	Variance & Properties	02/03	p. 122 #4.33,4.34, 4.37,4.43; p. 134 #4.51,4.5, p. 134 #4.55,4.56;
11	5.1-5.3	Discrete uniform & Binomial RV's	02/05	p. 150 #5.1,5.2; p. 150 # 5.3, 5.8,5.10
12	6.1, 6.2	Normal (Gaussian) RV	02/08 (MON)	(p. 185 # 6.20, 6.21,6.22) p. 185 #6.1,6.3,6.4
13	6.2, 6.4	Normal RV's (Sample mean distribution as example)	02/10	p. 185 #6.5, 6.7, 6.12, 6.14
14	**REVIEW**		**02/12**	
15		**EXAM 1**	**02/17 (WED)**	
16	A1-3	Matrix Review: Ops, Inv, Det; Gauss Elim & rank, Cramer's Rule	02/19	p. 10 #1.19abc); 1.21,1.22,1.27,1.28, 1.29,1.32abc); p. 22 #2.15,2.16, 2.21,2.22,2.24; p. 41 #4.15a),4.18, 4.19,4.27; p. 51 #5.21; 5.23a

17	A3-5	Square systems; LU (QR) factor; Det properties	02/22 (MON)	p. 32 #3.13,3.15, 3.16,3.18,3.19,3.24, 3.25,3.31,3.32
18	A6; Sect 2.1.1	Vectors, rank; Review: C#'s and C-plane	02/24	p. 58 #6.15, 6.17, 6.19,6.24; p. 5 #1,3,4,5, 6,7,8,9,10;
19	A7	EVP; simple e-values/e-vectors	02/26	p. 90 #9.16, 9.17, 9.18
20	Handout	Context: controllable systems and block matrix forms	03/01 (MON)	TBA
21	A9	Companion matrix (p. 70 #750)	03/03	p. 90 #9.16, 9.17,9.18
22	A9	Canonical Bases	03/05	p. 90 #9.20abc), 9.21,9.22
23	A10	Similar matrices and Jordan Canonical Form	03/08 (MON)	p. 101 #10.20, 10.21,10.23
24	A10	Similarity transforms and the Jordan form	03/10	p. 101 #10.26ac), 10.27,10.29,10.31
25	A13	Real, symmetric matrices, normal matrices, and eigenvalues: prop. 13.6	03/12	p. 126 #13.21, 13.22
26	**REVIEW**		**03/22 (MON)**	
27		**EXAM 2**	**03/24**	
28	Sect 2.1.2	Roots	03/26	p. 9 #1-7

29	Sect 2.4.5	Complex Fourier Series (CFS)	03/29 (MON)	p. 203 #1,3
30	Handout	Context: LTI filtering and Fourier Analysis	03/31	TBA
31	Sect 2.4.5	CFS & Frequency Spectra	04/02	p. 203 #5,6,7
32	Sect 2.4.6	Undet'd Coeff's & FS in DE's	04/05 (MON)	p. 211 #1, 2
33	Sect 2.4.6	FS in DE's (only do secular terms if time permits)	04/07	p. 211 #5,6
34	Sect 3.15.3	Complex Fourier Integral (CFI)	04/09	p. 652 # 2,3
35	Sect 3.15.3	CFI & Fourier Transform (FT)	04/12 (MON)	p. 652 #9,11
36	Sect 3.15.3	FT & IFT, Amplitude Spectra	04/14	p. 652 # 16,18,20
37	Sect 3.15.4	Properties of FT	04/16	p. 652 # 13, 23; p. 669 # 1,3
38	Sect 3.15.4	Convolution; Convolution Thm.	04/19 (MON)	p. 669 # 9,10,11
39	Sect 3.15.4 & Supplement B-1	Transfer Func & Green's Func	04/21	p. 669 # 12, 18 & Supplemental Prob
40	Handout	Context: State-space representations of transfer function systems	04/23	TBA
41	**REVIEW**		**04/26 (MON)**	

42		**EXAM 3**	**04/28**	
43		Final exam review	04/30	
44		Final exam review (last lecture)	05/03	

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