

**George Mason University**  
**Department of Systems Engineering**

**SYST 500 / CSI 600**

**Fall 2007**

**Quantitative Methods for Systems Engineering, Operations Research, and Computational Science**

**Description:**

This course is designed to provide the basic quantitative foundations that students need to pursue a graduate program in Systems Engineering, Operations Research, and Computational Science. Topics include vector and matrices, differential equations, Laplace transforms and probability theory. A brief review of calculus and complex numbers will also be provided. The course will require some computational work using the software *Matlab*, available on the GMU computer systems.

**Pre-requisites:**

MATH 203 (Matrix Algebra)  
MATH 213 (Analytic Geometry and Calculus III)  
MATH 214 (Elementary Differential Equations)

**Texts:**

Dennis G. Zill and Michael R. Cullen, *Advanced Engineering Mathematics (3rd Edition)*, Jones and Bartlett (2005)  
Hwei Hsu *Probability, Random Variables and Random Processes Schaum Outline Series*, McGraw Hill, 1996

**Instructor:** Dr. Monica Carley-Spencer [mcarley@gmu.edu](mailto:mcarley@gmu.edu) (703) 983-7045

**Policy:** All work is to be done individually. All students must abide by the GMU Honor Code. Homework is due at the beginning of class, one class period from the date assigned, unless otherwise indicated. Late homework will be not be accepted.

**Class website:** <http://mason.gmu.edu/~mcarley/syst500>

**Class Outline:**

Week 1	Monday 8/27	Introduction, vectors and matrices	Z&C: Ch 7, 8.1-8.2	
Week 2	Monday 9/3	Labor Day Holiday – no class		
Week 3	Monday 9/10	Matrices: rank, determinants, inverse	Z&C: Ch 8.3-8.6	HMWK 1 due
Week 4	Monday 9/17	Eigenvalues/vectors, complex numbers	Z&C: Ch 8.8	HMWK 2 due
Week 5	Monday 9/24	Calculus review	Other sources	HMWK 3 due
Week 6	Monday 10/1	First-order differential equations	Z&C: Ch 1, 2	HMWK 4 due
Week 7	<b>Tuesday 10/9</b>	Higher-order differential equations	Z&C: Ch 3.1, 3.3	HMWK 5 due
Week 8	Monday 10/15	MID-TERM EXAM	Ch1, Ch2, Ch7, Ch8, & Calculus	
Week 9	Monday 10/22	Higher-order differential equations, Systems of differential equations	Z&C: Ch 3.4, 3.11	HMWK 6 due
Week 10	Monday 10/29	Systems of differential equations	Z&C: Ch 10.1-10.2	HMWK 7 due
Week 11	Monday 11/5	Laplace transforms	Z&C: Ch 4	HMWK 8 due
Week 12	Monday 11/12	Power and geometric series	Z&C: Ch 5.1, other	HMWK 9 due
Week 13	Monday 11/19	Probability and random variables	Hsu: Ch 1-2	HMWK 10 due
Week 14	Monday 11/26	Multiple random variables	Hsu: Ch 3	HMWK 11 due
Week 15	Monday 12/3	Review		HMWK 12 due
Week 16	Monday 12/10	Reading Day – no class		
Week 17	Monday 12/17	FINAL EXAM	Comprehensive	

**Grading:** Homework = 36%, Midterm Exam = 32%, Final Exam = 32%

A: 90-100%

B: 80-89%

C: 70-79%

F: < 70%