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

**SYST 500 / CSI 600** **Fall 2005**
**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 (2nd Edition)*, Jones and Bartlett (2000)
Hwei Hsu *Probability, Random Variables and Random Processes Schaum Outline Series*, McGraw Hill, 1996

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

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

**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.html

**Class Outline:**

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|---|---|---|---|---|
| Week 1 | Monday 8/29 | vectors and matrices | Z&C: Ch 7 | |
| Week 2 | Monday 9/5 | *** no class - Labor Day Holiday *** | | |
| Week 3 | Monday 9/12 | matrices, linear systems, intro Matlab | Z&C: 8.1-8.2, other | HMWK 1 due |
| Week 4 | Monday 9/19 | matrices: rank, determinants, inverse | Z&C: Ch 8.3-8.6 | HMWK 2 due |
| Week 5 | Monday 9/26 | eigenvalues/vectors, complex numbers | Z&C: Ch 8.8 | HMWK 3 due |
| Week 6 | Monday 10/3 | review of calculus | Other sources | HMWK 4 due |
| Week 7 | Tuesday 10/11 | *** no class *** | | |
| Week 8 | Monday 10/17 | differential equations | Z&C: Ch 1, 2 | HMWK 5 due |
| Week 9 | Monday 10/24 | MID-TERM EXAM | | HMWK 6 due |
| Week 10 | Monday 10/31 | higher-order differential equations | Z&C: Ch 3.1, 3.3-3.5 | HMWK 7 due |
| Week 11 | Monday 11/7 | systems of differential equations | Z&C: Ch 3.11, 10.1-10.2 | HMWK 8 due |
| Week 12 | Monday 11/14 | Laplace transforms | Z&C: Ch 4.1-4.2 | HMWK 9 due |
| Week 13 | Monday 11/21 | power and geometric series | Z&C: Ch 5.1, other | HMWK 10 due |
| Week 14 | Monday 11/28 | probability and random variables | Hsu: Ch 1-2 | HMWK 11 due |
| Week 15 | Monday 12/5 | multiple random variables | Hsu: Ch 3 | HMWK 12 due |
| Week 16 | Monday 12/12 | FINAL EXAM (7:30-10:15 PM) | Comprehensive | |