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

**SYST 500 / CSI 600**                                                                 **Fall 2009**
**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 113 (Analytic Geometry and Calculus I)
                                          MATH 114 (Analytic Geometry and Calculus II)
**Text:**
Advanced Engineering Mathematics (Sixth Edition) by Peter O'Neil (2006)

**Instructor:** Dr. Monica Carley-Spencer (703) 983-7045

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

**Class website:** login to Blackboard and click on this course (http://courses.gmu.edu)

**Class outline:**

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|---|---|---|---|---|
| Week 1 | Thursday 9/3 | Introduction, vectors and matrices | | |
| Week 2 | Thursday 9/10 | Matrices: rank, determinants, inverse | | HMWK 1 due |
| Week 3 | Thursday 9/17 | Eigenvalues/vectors, complex | | HMWK 2 due |
| Week 4 | Thursday 9/24 | Calculus review | | HMWK 3 due |
| Week 5 | Thursday 10/1 | No Class | | |
| Week 6 | Thursday 10/8 | First-order differential equations | | HMWK 4 due |
| Week 7 | Thursday 10/15 | Higher-order differential equations | | HMWK 5 due |
| Week 8 | **Thursday 10/22** | **MID-TERM EXAM** | Weeks 1-6 (HMWKs 1-5) | HMWK 6 due |
| Week 9 | Thursday 10/29 | Higher-order differential equations | | HMWK 7 due |
| Week 10 | Thursday 11/5 | Systems of differential equations | | HMWK 8 due |
| Week 11 | Thursday 11/12 | Laplace transforms | | HMWK 9 due |
| Week 12 | Thursday 11/19 | Power and geometric series | | HMWK 10 due |
| Week 13 | Thursday 11/26 | Thanksgiving recess – No Class | | |
| Week 14 | Thursday 12/3 | Probability and random variables | | HMWK 11 due |
| Week 15 | Thursday 12/10 | Multiple random variables & Review | | HMWK 12 due |
| Week 16 | **Thursday 12/17** | **FINAL EXAM** | Comprehensive | Extra credit due |

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

**A-/A/A+**: 90-92, 93-97, 98-100%, **B-/B/B+**: 80-82, 83-87, 88-89%, **C-/C/C+**: 70-72, 73-77, 78-79%, **F**: < 70%