

**GEORGE MASON UNIVERSITY
Volgenau School of Engineering**

**SYST 500 – Section 001
Quantitative Methods for Systems Engineering and Operational Research**

**Fall 2015
Syllabus**

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Course Description

This course is designed to provide the basic quantitative foundations that students need to pursue a graduate program in Systems Engineering and Operations Research. Topics include a review of calculus, complex numbers, infinite series, vector and matrices, differential equations, Laplace and Fourier transforms, linear systems, and an introduction to probability theory. Credits: 3

Instructor

Name: Dr. Tom Clemons

Email: tclemons@gmu.edu (preferred method of communication)

Phone: (703) 614-3788

Virtual Office Hours: By appointment via Blackboard Collaborate.

I am available for student inquiries via email. During this 5 day period, I will respond to student inquiries within 24 hours during the week and by Monday evening during the weekend.

Course Prerequisites

MATH 203 (Matrix Algebra)

MATH 113 (Analytic Geometry and Calculus I)

MATH 114 (Analytic Geometry and Calculus II)

Required Text and Software

Text (Required): Advanced Engineering Mathematics (7th Ed.) by Peter O'Neil
ISBN-13: 978-1-111-42741-2

(Note: Ensure you do not get the international version or the 6th or earlier editions, these are not compatible with the class)

Software (Recommended): Matlab+Simulink R2014A, Student Version
ISBN-13: 9780989614023

MATLAB is also available on all computers at GMU and online via the Virtual Computing Lab.
[VCL link for PC](#), [VCL link for Mac](#)

Course Expectations/Policy

1. Graduate work requires dedication and organization. Proper preparation is expected every week. You are to log in to the course blackboard site each week and complete the assignments and activities on or before the due dates.
2. Students must check their GMU email messages on a **daily** basis for course announcements, which may include reminders, revisions, and updates. You may want to configure your GMU email to auto-forward to your personal/work email.
3. It is expected that you will familiarize yourself with and adhere to the [Honor Code](#). Student members of the George Mason University community pledge not to cheat, plagiarize, steal, and/or lie in matters related to academic work.
4. It is essential to communicate any questions or problems to me promptly.

Learning Outcomes

1. Students will demonstrate various methodologies of solving differential equations and systems of differential equations.
2. Students will understand the concepts of Laplace and Fourier transforms and apply them in solving an initial value problem for an nth order ordinary differential equation.
3. Students will use MATLAB to demonstrate numerical solutions of differential equations.
4. Students will utilize vector and matrix methodologies to solve systems of differential equations.
5. Students will understand fundamental concepts of probability and statistics and solve simple problems.

Performance-based Assessments and Grading

1. Homework (30%):

Homework is where you learn the material through practice. Homework is assigned weekly except during exam weeks and is due by Sunday evening the week it is assigned. Unless prior arrangements are made, late homework will not be accepted. You must show your work to achieve full credit. Partial credit is given for incorrect solutions.

2. EXAMS (60%):

Two exams will be given, one midterm approximately halfway through the school year and a final at the end of the year. You may take the exams in the classroom during the in-class period, elsewhere with an approved proctor, or at home with a video monitoring system. The exams will be closed book, and timed. You must show your work to achieve full credit. Partial credit is given for incorrect solutions. See the exam proctoring requirement in the next section

3. MATLAB Project (10%):

Students will create a program in MATLAB that will compute numerical solutions to a differential equation, plot those solutions, and calculate the error of the solution when compared to the exact answer. This project will be assigned in parts throughout the semester and due at various points during the term.

Final grades are assigned as follows:

A/A-: 100-93, 92-90%;

B+/B/B-: 89-87, 86-83, 82-80%;

C+/C/C-: 79-77, 76-73, 72-70%;

F: < 70%

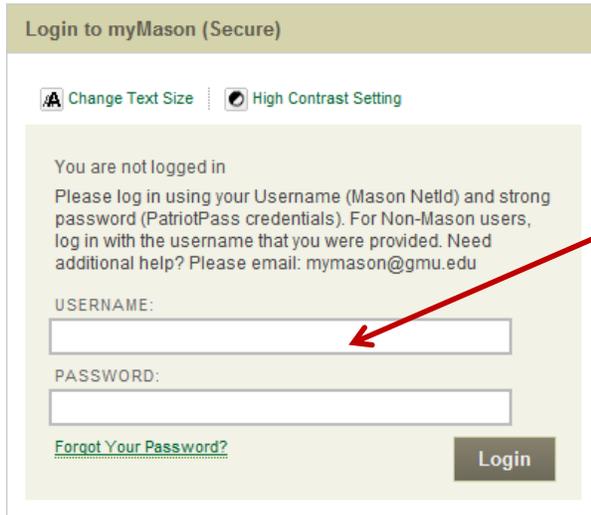
Course Schedule

| Week | Dates | Lesson | Reading | Assignment |
|---------|--------|--|---------------------|---------------------------|
| Week 1 | Sep 1 | Lesson 1: Calculus / Complex Number Review | Calculus text | Bio's due |
| Week 2 | Sep 8 | Lesson 2: First-order differential equations – MATLAB basics | Sec 1.1-3,5 | HW 1 due |
| Week 3 | Sep 15 | Lesson 3: Higher-order differential equations | Sec 2.1-4 | HW 2 due |
| Week 4 | Sep 22 | Lesson 4: Laplace transforms and Fourier Series | Chp 3 | HW 3 due Project Pt 1 |
| Week 5 | Sep 29 | Lesson 5: Power Series Solutions – More MATAB | Chp 21 & 4 | HW 4 due |
| Week 6 | Oct 6 | Lesson 6: Numerical Methods – Test review | Chp 5 | HW 5 due |
| Week 7 | Oct 13 | Columbus Day – No Class | | HW 6 due |
| Week 8 | Oct 20 | MID-TERM EXAM Lessons 1-6 (HWs 1-6) | | |
| Week 9 | Oct 27 | Lesson 7: Vectors | Chp 6 | Project Pt 2 |
| Week 10 | Nov 3 | Lesson 8: Matrices and Linear Systems | Chp 7 | HW 7 due |
| Week 11 | Nov 10 | Lesson 9: Determinants and Inverses | Chp 8 | HW 8 due |
| Week 12 | Nov 17 | Lesson 10: Eigenvalues/vectors | Chp 9 | HW 9 due |
| Week 13 | Nov 24 | Lesson 11: Systems of Differential Equations | Chp 10 | HW 10 due |
| Week 14 | Dec 1 | Lesson 12: Probability and random variables | Website or PDF file | HW 11 due Project Pt 3 |
| Week 15 | Dec 8 | Lesson 13: Multiple random variables & Exam Review | Website or PDF file | HW 12 due |
| Week 16 | Dec 15 | FINAL EXAM Lessons 8-14 (HWs 7-13) | | |

Online Learning Community

Instructions for accessing your course via Blackboard

Access to Blackboard is through a portal called MyMason. The URL for the MyMason portal is: <https://mymasonportal.gmu.edu/> . Once there click on the link for this course.

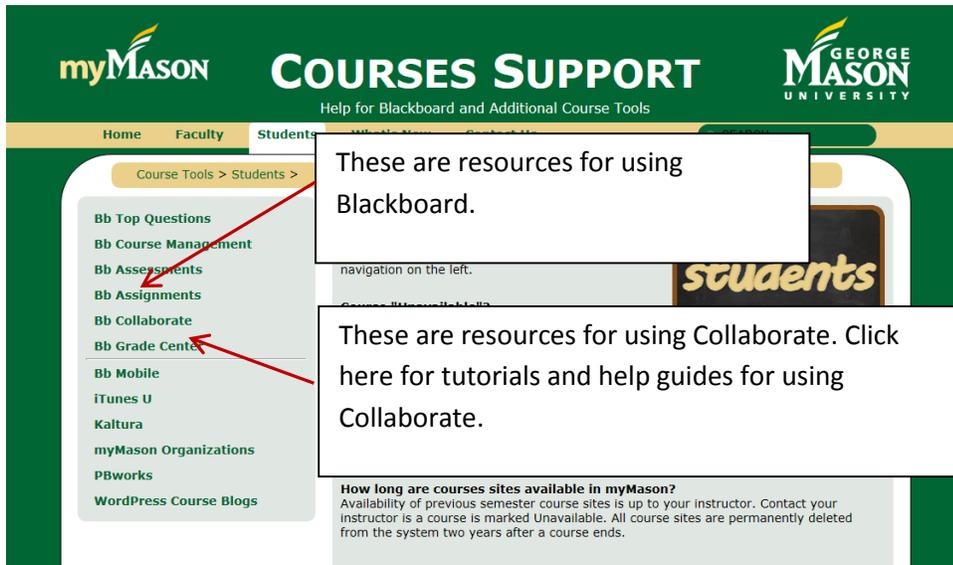


You'll see a screen with a login space.

Login using your Mason netID and password, which is the same as your email username and email password.

Help Files for Using Blackboard

On the right column of your courses page you will see a link for Blackboard help which will take you to this page.



School Policies

Academic Integrity

Students must be responsible for their own work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be a foundation of our university culture. [See <http://academicintegrity.gmu.edu/distance>].

Honor Code

Students must adhere to the guidelines of the George Mason University Honor Code [See <http://oai.gmu.edu/honor-code/masons-honor-code/>].

MasonLive/Email (GMU Email)

Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account. [See <https://thanatos.gmu.edu/masonlive/login>].

Patriot Pass

Once you sign up for your Patriot Pass, your passwords will be synchronized, and you will use your Patriot Pass username and password to log in to the following systems: Blackboard, University Libraries, MasonLive, myMason, Patriot Web, Virtual Computing Lab, and WEMS. [See <https://thanatos.gmu.edu/passwordchange/index.jsp>].

University Policies

Students must follow the university policies. [See <http://universitypolicy.gmu.edu>].

Responsible Use of Computing

Students must follow the university policy for Responsible Use of Computing. [See <http://universitypolicy.gmu.edu/1301gen.html>]. Students are expected to follow courteous Internet etiquette.

University Calendar

The course follows the university calendar that includes holidays, withdrawal dates, and exam schedules. [See <http://registrar.gmu.edu/calendars/fall-2014/>].

- Religious Holidays

A list of religious holidays is available on the University Life Calendar page (<http://ulife.gmu.edu/calendar/religious-holiday-calendar/>). Any student whose religious observance conflicts with a scheduled course activity must contact the Instructor at least 2 weeks in advance of the conflict date in order to make alternative arrangements.

Students with Disabilities

Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See <http://ods.gmu.edu>].

Student Services

University Libraries

University Libraries provides resources for distance students. [See <http://library.gmu.edu/distance>].

Writing Center

The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. [See <http://writingcenter.gmu.edu>]. You can now sign up for an Online Writing Lab (OWL) session just like you sign up for a face-to-face session in the Writing Center, which means YOU set the date and time of the appointment! Learn more about the [Online Writing Lab \(OWL\)](#) (found under Online Tutoring).

Counseling and Psychological Services

The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See <http://caps.gmu.edu>].

Family Educational Rights and Privacy Act (FERPA)

The Family Educational Rights and Privacy Act of 1974 (FERPA), also known as the "Buckley Amendment," is a federal law that gives protection to student educational records and provides students with certain rights. [See <http://registrar.gmu.edu/privacy>].

Additional Course Resources

The Khan Academy website provides additional videos covering many of the topics we will discuss in the course. The free website is available at www.khanacademy.org. Although the site asks you to log in, an account is not required to use this resource, simply click on the <Courses> link at the top of the page.