Course Change Request

New Course Proposal

Date Submitted: 04/11/18 4:50 pm

Viewing: **CSI 590 : Quantitative Foundations for Computational Sciences**

Last edit: 04/11/18 4:50 pm

Changes proposed by: mrenz

Are you completing this form on someone else's behalf?

No

Effective Term:	Fall 2018
Subject Code:	CSI - Computational Science & Informatics
Course Number:	590
Bundled Courses:	
Equivalent Courses:	SYST 500 - Quantitative Foundations for Systems Engineering
Catalog Title:	Quantitative Foundations for Computational Sciences
Banner Title:	Quantitative Foundations
Will section titles vary by semester?	No
Credits:	3
Schedule Type:	Lecture
Hours of Lecture or Seminar per week:	3
Repeatable:	

		May only be taken once for credit, limited to 2 attempts (N2)	**Max Allowable Credits:** 3

Default Grade Mode:

Graduate Regular

Recommended Prerequisite(s):

  MATH 213 and 214.

Recommended Corequisite(s):

  Replaces CSI 600. Level adjustment for consistency in the CSI program. Open up this course for undergrads.

Required Prerequisite(s) / Corequisite(s) (Updates only):

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

Registration Restrictions (Updates only):

Registrar's Office Use Only - Registration Restrictions:

      Field(s) of Study:

      Class(es):

  Include

      Level(s):

  Include

      Degree(s):

  Exclude

      School(s):

Catalog Description:

Accelerated review of mathematical tools for scientific applications and analysis. Topics include vectors and matrices; differential and difference equations; linear systems; Fourier, Laplace, and Z-transforms; and probability theory. Notes: Not applicable to 48-credit course total for CSI PhD.

Justification:
Replaces CSI 600, number justification for consistency in the program, also allows undergrads to participate.

Does this course cover material which crosses into another department?   No

Learning Outcomes:

**Attach Syllabus
(PDFs only)**
Fall 2017 SYST 500-DL2 Syllabus.pdf

**Additional
Attachments (PDFs
only)**

Staffing:
potentially new faculty

**Relationship to
Existing Programs:**
course number adaption in the CSI program

**Relationship to
Existing Courses:**
crosslisted with SYST 500

**Additional
Comments:**

**Reviewer
Comments**

Key: 15888

GEORGE MASON UNIVERSITY
Volgenau School of Engineering

SYST 500/CSI 600 – Section DL2
Quantitative Foundations for Systems Engineering and Operational Research

Fall 2017 Syllabus

Contents

Course Description

This asynchronous online 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) 993-5886
Office: Engineering Building Room 2226

Virtual Office Hours: Wednesday 2 – 4pm, or by appointment via Blackboard Collaborate. I am available for student inquiries from Monday through Friday 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: Advanced Engineering Mathematics (7th Ed.) by Peter O'Neil
ISBN-10: 1111427210; ISBN-13: 9781111427412
(Note: Ensure you do not get the international version or the 6th or earlier editions, these are not compatible with the class)

Software: Matlab+Simulink R2017A, Student Version

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. Working online requires dedication and organization. Proper preparation is expected every week. You are expected to log in to the course 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 incur a 5 point penalty per day. 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 or elsewhere with an approved proctor. Make up requests will require exceptional circumstances. 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 the end of the year.

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 0	8/21 – 8/27	Orientation Introduction	None	
Week 1	8/28 – 9/3	Lesson 1: Calculus / Complex Number Review	Calculus text	Bio's due HW 1
Week 2	9/4 – 9/10	Lesson 2: First-order differential equations – MATLAB basics	Sec 1.1-3,5	HW 2
Week 3	9/11 – 9/17	Lesson 3: Higher-order differential equations	Sec 2.1-4	HW 3
Week 4	9/18 – 9/24	Lesson 4: Laplace transforms and Fourier Series	Chp 3	HW 4
Week 5	9/25 – 10/1	Lesson 5: Power Series Solutions	Chp 21 & 4	HW 5 Project Pt 1
Week 6	10/2 – 10/8	Lesson 6: Numerical Methods – More MATAB	Chp 5	HW 6
Week 7	10/9 – 10/15	Lesson 7: Vectors	Chp 6	HW 7
Week 8	10/16 – 10/22	**MID-TERM EXAM** Lessons 1-6 (HWs 1-6)		
Week 9	10/23 – 10/29	Lesson 8: Matrices and Linear Systems	Chp 7	HW 8
Week 10	10/30 – 11/5	Lesson 9: Determinants and Inverses	Chp 8	HW 9 Project Pt 2
Week 11	11/6 – 11/12	Lesson 10: Eigenvalues/vectors	Chp 9	HW 10
Week 12	11/13 – 11/19	Lesson 11: Systems of Differential Equations	Chp 10	HW 11
Week 13	11/20 – 11/26	**Thanksgiving Break**		
Week 14	11/27 – 12/3	Lesson 12: Probability	Website or PDF file	HW 12 Project Pt 3
Week 15	12/4 – 12/10	Lesson 13: Random Processes	Website or PDF file	HW 13
Week 16	12/11 – 12/17	**FINAL EXAM** Lessons 8-14 (HWs 7-13)		

Online Learning Community

This online course is taught via Blackboard Courses (Log into http://mymason.gmu.edu, select the Courses Tab, and the course can be found in the Course List).

This course is offered completely online. Each week begins on Monday and ends on Sunday. Weekly modules contain reading requirements, slides of the week's material, videos presenting the week's material, and homework assignments due that week. A discussion board is available to ask me questions and to discuss the material with other students. I will hold office hours via Blackboard Collaborate by appointment.

In our online learning community, we must be respectful of one another. Please be aware that innocent remarks can be easily misconstrued. Sarcasm and humor can be easily taken out of context. When communicating, please be positive and diplomatic. I encourage you to learn more about Netiquette.

Technology Requirements

For hardware and software purchases, visit Patriot Computers.

Hardware:
You will need access to a Windows or Macintosh computer with at least 2 GB of RAM and to a fast, reliable broadband Internet connection (e.g., cable, DSL). For optimum visibility of course material, the recommended computer monitor and laptop screen size is 13-inches or larger. You will need computer speakers or headphones to listen to recorded content. A headset microphone is recommended for live audio sessions using course tools like Blackboard Collaborate. For the amount of computer hard disk space required to take an online course, consider and allow for the space needed to: 1) install the required and recommended software and, 2) save your course assignments.

Software:
Web browser (See Blackboard Support for supported web browsers)
Blackboard Courses (Log into http://mymason.gmu.edu, select the Courses Tab)
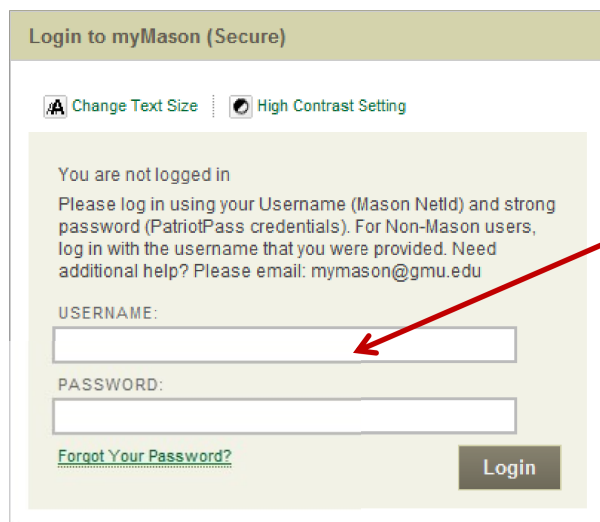Blackboard Collaborate (select from the course menu)
Adobe Acrobat Reader (free download)
Flash Player (free download)
Microsoft Office (purchase)

Note: If you are using an employer-provided computer or corporate office for class attendance, please verify with your systems administrators that you will be able to install the necessary applications and that system or corporate firewalls do not block access to any sites or media types.

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.

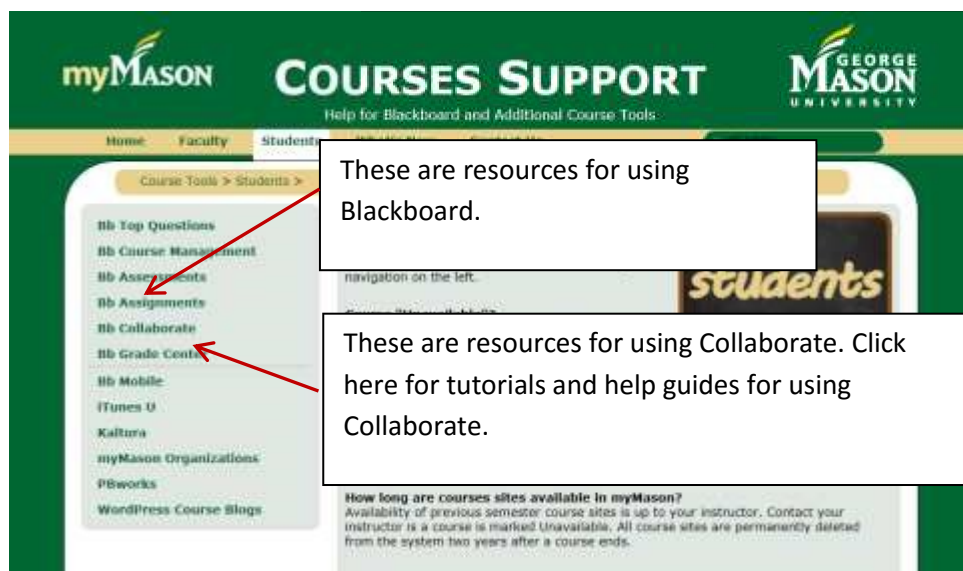You'll see a screen with a login space.

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

Using Blackboard Collaborate
We will use Blackboard Collaborate for office hour sessions. This means that you must log into Blackboard and connect to the Collaborate session within Blackboard. A student guide for using Collaborate is located at the following URL: Students Bb Collaborate Student Quick Guide

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.

These are resources for using Blackboard.

These are resources for using Collaborate. Click here for tutorials and help guides for using Collaborate.

Exam Proctoring Requirements

1. Distance Testing Authorized Locations:
Tests can be taken at any of the following locations:

a) At commercial or institutional testing centers.
b) Through an approved test proctor (approved by the faculty member requiring the proctored exam).
c) Through the faculty member.
d) At an approved site at the Fairfax campus of George Mason (the Mason Fairfax Math Testing Center is such a site.
e) In the classroom with the regularly scheduled classes.
Note: If students can come on site the day of the test it will greatly facilitate logistics for students as well as instructor (best case scenario).

2. Proctor Qualifications and Validation
Proctors should be found from one of the following groups:

a) Faculty member, administrator, or other professional staff member of a school or college.
b) Qualified staff member at a commercial testing center.
c) Educational counselor.
d) Library staff member.
e) Member of the clergy.
f) Commanding officer.
g) Other professional designated by the faculty member and Chair of the program.
Note: Proposed proctors will be validated by the instructor prior to the exam date. Please allow for at least three business days in order to appropriately fulfill this requirement – and provision for enough lead time in case a proctor does not meet the validation check point. Proctor Agreement Form will be provided.

3. Guidelines for setting up proctored exams:
Two weeks prior to exam week the student will:

a) Find an approved proctor, complete and submit the proctor validation form to the Instructor.
b) Arrange a date and time during exam week to take the exam.
c) The exam will be faxed to the proctor 2 days prior to the exam.
d) Upon completing the exam, the exam will be returned to the instructor by the proctor either by email, fax or mail within 3 days.

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 Academic Integrity].

Honor Code
Students must adhere to the guidelines of the George Mason University Honor Code [See 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 MasonLive].

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 Patriot Pass].

University Policies
Students must follow the university policies. [See University Policy].

Responsible Use of Computing
Students must follow the university policy for Responsible Use of Computing. [See University Policy on Responsible Use of Computing]. 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 (See: 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 Office of Disability Services].

Student Services

University Libraries
University Libraries provides resources for distance students. [See University Libraries].

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 Writing Center]. 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 Counseling and Psychological Sevices].

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 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.