

ESC 352

Spring 2018  
Advanced Scientific Computing

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**Office Hours:**  
11:00 - 12:00 MWF  
And by appointment

**Prerequisites:**

- \* ESC 251: Scientific Computing

**Textbook:**

- \* Materials as distributed in class.

**Description:** Mathematical modeling forms a critical component to scientific discovery. These models often cannot be solved by hand, due either to problems size or complexity. Nonetheless, solutions to the models are required. This course provides an introduction to scientific modeling and the associated computational tools and processes necessary to solve such models. The emphasis will be on deterministic models that result in linear systems and differential equations however stochastic methods will also be briefly discussed.

- 1) The UNIX operating system
- 2) Review of concepts in linear algebra
- 3) Use of external libraries in scientific programming
- 4) Matlab programming
- 5) Modeling (Stochastic vs. Deterministic)
- 6) Random Number Generation and Monte Carlo Methods
- 7) Models involving a single ordinary differential equation
- 8) Models involving coupled systems of ordinary differential equations

**Grading:**

Your final grade will be based on:

- 70% Homework assignments
- 30% 1 project (will require a formal technical report).

Average	Grade	Average	Grade
100-95.0	A	74.0-76.9	C
94.9-90.0	A-	70.0-73.9	C-
87.0-89.9	B+	67.0-69.9	D+
84.0-86.9	B	64.0-66.9	D
80.0-83.9	B-	60.0-63.9	D-
77.0-79.9	C+	< 60.0	E

Your final weighted average will be determined using the weights indicated and your grade will be determined according to the following scale:

The instructor may administer quizzes in class (announced or unannounced) at any time. These will be included with the take-home project scores. This will almost certainly be done if significant numbers of students fail to submit homework assignments on a timely basis or produce a very low quality of work.

From time to time, there will be in-class projects (10 points each, counted in the homework total). If you are absent, these cannot be made up.

### **Assignments:**

Homework assignments given in class will have varying due dates. Short assignments will usually be due at the next class meeting while longer assignments will be due in 1-2 weeks time. These assignments typically involve analytical investigation and computer programming. Late assignments will be penalized at a rate of 25% points per day. Homework is due at the beginning of class. No assignments of any type will be accepted after the final class meeting day. Students may meet together in small groups to discuss aspects of a given assignment, but all work presented must be your own.

As the semester proceeds, all assignments will need to be produced using document processing software as MS Word. When computer output is requested, provide printouts of the programs and other material as requested. Do not submit large volumes of printed data.

### **Policies**

**Students with Special Needs** Students with documented disabilities may be entitled to specific accommodations. SUNY Brockport's Office for Students with Disabilities makes this determination. Please contact the Office for Students with Disabilities at 395-5409 or [osdoffic@brockport.edu](mailto:osdoffic@brockport.edu) to inquire about obtaining an official letter to the course instructor detailing approved accommodations. The student is responsible for providing the course instructor with the official letter. Faculty and staff work as a team with the Office for Students with Disabilities to meet the needs of students with disabilities.

*NO CELL PHONES OR PAGERS.* These are distracting to other students. You will lost 1/2 credit on your next homework assignment if a cell phone or pager goes off during class.

### **Attendance:**

You are expected to attend all classes. Significant amounts of material are not contained in the textbook. If you miss a class, it is your responsibility to get class notes and handouts and find out what you missed. The instructor reserves the right to fail any student who acquires more than 4 unexcused absences.

No incompletes or withdrawals will be given for this course except in cases of illness, personal tragedy, or extraordinary circumstances beyond the student's control, and then only if documented to the instructor's satisfaction.

Here is the official SUNY Brockport Attendance Policy:

*The student is responsible for all assigned course work and cannot be absolved of this responsibility. When enrolled in a particular course, the student is obligated to do all of the work assigned. Punctual and regular attendance is vital to the discharge of this obligation. Absences, excused or not, do not alter this responsibility. Absences deemed excessive by the instructor may result in a lowered grade. Students whose*

*unexcused absences exceed 15% of the scheduled classes and laboratories will be subject to failure at the instructor's discretion. Absences will be excused for (a) documented illness, (b) official representation of the college, (c) death of a close relative, (d) religious holiday, and (e) circumstances beyond the control of the student. Excuses for official representation of the college must be obtained from the official supervising that activity or event. Policies regarding absences from quizzes, exams, and laboratory sessions will be at the discretion of the instructor. Substantiation of excused absences is, in any case, the responsibility of the student. Regulations more restrictive than those stated above may be established by the instructor.*

**Authorship:**

When you turn in an assignment, you are certifying it as your own work. Submitting material as your own work that is not entirely of your own authorship, or knowingly providing an answer to another person constitutes cheating. If I am convinced beyond a reasonable doubt that cheating has occurred, the person(s) submitting the illicitly obtained answer, and any person(s) knowingly providing same, will receive a grade of zero for that assignment. Further disciplinary procedures may also be considered.

**Buckley Amendment:**

The purpose of the Buckley Amendment is to protect the confidentiality of your grades. This law states that I cannot reveal any information regarding your performance in the course to anyone other than yourself and authorized college administrators without your written permission.

**Title IX Statement:**

Gender discrimination and sexual harassment are prohibited in class. Title IX legislation requires the College to provide gender equity in all areas of campus life. If you or someone you know has experienced gender discrimination, sexual harassment, or sexual assault, we encourage you to seek assistance and to report the incident through resources available at [www.brockport.edu/titleix/index.html](http://www.brockport.edu/titleix/index.html). Confidential assistance is available at Hazen Center for Integrated Care. For these and other regulations governing campus life, please see all of our Student Policies at [www.brockport.edu/policies/index.php](http://www.brockport.edu/policies/index.php).

**Emergency Alert Statement:**

In case of emergency, the Emergency Alert System at The College at Brockport will be activated. Students are encouraged to maintain updated contact information using the link on the College's Emergency Information website, <https://www.brockport.edu/support/emergency>. Included on the website is detailed information about the College's emergency operations plan, classroom emergency preparedness, evacuation procedures, emergency numbers, and safety videos. In addition, students are encouraged to familiarize themselves with the Emergency Procedures posted in classrooms, halls, and buildings and all college facilities.

**Disclaimer:**

Announcements given in class are considered official addenda to this policy. All policies described are subject to change as the situation warrants. Should changes be necessary, all students will be notified in a timely fashion.