
Spring 2020

20419/24089

Math/CS 4334

Math/CS 4334.001

MW 5:30-6:45pm

Numerical Analysis

GR 2.302

Lectures:

Instead of the usual class times, video lectures will be posted in eLearning course, Math4334.501 (or CS4334.501). Lectures and lecture notes relevant to material scheduled for a given week will be posted by Monday of that week, e.g., the lecture material that would be covered on Mon., 4/13, and Wed., 4/15, in the schedule below, will be posted in video form by Monday, 4/13.

Instructor Information

Instructor: Dr. Bentley Garrett

Office: FA 2.406

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Campus Mail: Mail Stop FO 35

Office hours:

- 1) **TR 1:00p-2:30pm - will be conducted via Blackboard Collaborate in eLearning. You will soon be receiving a link in your email and eLearning announcements that will give you access to these sessions. Please refer back to this link so that you can reuse it for access whenever you might need it during these times. Blackboard Collaborate is a teleconferencing tool which allows for audio communication, file/screen sharing, etc. A guide can be found here: <https://help.blackboard.com/Collaborate/Ultra/Participant> For some of the basic functions, after you click the link:
 - a. Enter your name and click Join Session
 - b. To speak, click on the microphone icon at the bottom center
 - c. To share files or your computer screen, click the magenta tab at the bottom right
 - a) Click the icon at the bottom right that has a rectangle with an arrow on it
 - b) Then, click Share application/screen, Share file, etc.**
- 2) **As usual, I will also be answering emails as I get to them outside of office hours.**

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Prerequisites: (MATH 2370 or CS 1324 or CS 1325 or CE 1337 or CS 1337 or TE 1337) and (MATH 2418 and MATH 2451).

Course Description

Solution of linear equations, roots of polynomial equations, interpolation and approximation, numerical differentiation and integration, solution of ordinary differential equations, computer arithmetic, and error analysis.

Student Learning Objectives/Outcomes

- 1) Students are able to describe fundamental concepts and procedures in mathematics and their applications. (Basic Concepts).
- 2) Apply formal mathematical arguments in analysis, model creation, justification of computational procedures (Advanced Concepts).
- 3) Application of mathematics in other fields and working knowledge of computational packages such as MATLAB. (Software Application)

Required Textbooks and Materials

Text: *Numerical Analysis, Third Edition*, by Timothy Sauer, Pearson

e-book: ISBN-13: 9780134697376

Loose leaf: ISBN-13: 9780134697338

Hard cover: ISBN-13: 9780134696454

MATLAB software: You will be required to use MATLAB for any programming assignments. To this end, you will need to set up a MATLAB license here, if you do not already have one: <http://www.utdallas.edu/oit/howto/matlab/> This license will enable you to do two things:

- 1) You will be able to download the MATLAB software package on your own computer for free (instructions also given on the above website).
- 2) Using your MATLAB license username/password, you will also be able to login to the website, <https://grader.mathworks.com/> (MATLAB Grader) which will give you access to the course, **Math 4334 SP20**, where you will complete all of your programming assignments. An email with a link will soon be sent to you where you will access this MATLAB Grader course for the first time; for subsequent times, there will also be a link in the eLearning course, referenced below.

Note:

- **In order to access the MATLAB Grader course, Math 4334 SP20, for the first time, you MUST use the link that will be emailed to you.**
- **You can use the MATLAB software package that you download (item 1) to practice on your programming assignments, if you wish, but all programs will ultimately be submitted on <https://grader.mathworks.com/>.**
- **Also, submitted programs may be compared using software that detects similarities. You may help one another on the assignments, but the final submitted code should be yours and not a copy of another code (or a copy with only variable changes, etc.)**
- **Free access to MATLAB is also available in the campus computer labs: see <http://www.utdallas.edu/ir/labs/#locations> for details.)**

eLearning: <http://elearning.utdallas.edu> You must enter your NETID username and password to logon to eLearning. You will need to access the course: **MATH 4334.001- S20** or **CS 4334.001- S20**. Here, you will find the syllabus, assignments, handouts, etc., as well as a record of your grades. Any messages/emails concerning the class will also appear on eLearning (and your UTD email account).

Calculators: On occasion, a scientific calculator will be needed. Graphing calculators, programmable calculators, calculators with non-numeric displays, or any calculators that perform calculus operations are not allowed on quizzes or exams.

Suggested Course Materials/Additional Resources

Student Solutions Manual - for the textbook is also available from the publisher, and may be available through the UTD Bookstore.

Math Lab - Student Success Center: located at MC 1.401 (phone: 972-883-5480, website: <https://www.utdallas.edu/studentssuccess/help-with-courses/peertutoring/>), M-R: 10:00a – 7:00p, F and S: 10:00a – 4:00p. You can set up one-on-one and possibly group appointments via this link: <https://utdallas.edu/studentssuccess/help-with-courses/peer-tutoring-math/one-on-one-appointments/>

Assignments & Academic Calendar (subject to change)

Topics:	Relevant Chapters/Sections in Sauer Text:
Section 1: Computer Arithmetic and Error Analysis	Chapter 0: 0.1-5
Section 2: Roots of Nonlinear Equations	Chapter 1: 1.1-5
Section 3: Systems of Linear/Nonlinear Equations	Chapter 2: 2.1-5, 2.7
Section 4: Interpolation and Approximation	Chapter 3: 3.1-4
Section 5: Numerical Differentiation and Integration	Chapter 5: 5.1-3
Section 6: Solution of Ordinary Differential Equations	Chapter 6: 6.1-3, 6.6, 7.1-2

Tentative schedule is below. Also, note that “SM” means “Supplementary Material” not in text.

Week	M		W	
1	1/13	Introduction, Sec. 1 p.1-7 2 nd ed:p.1-7	1/15	Sec.1 Post HW1 p.8-14 2 nd ed:p. 8-13

2	1/20	MLK Day	1/22	Sec.1 SM
3	1/27	Sec.1 p.17-20,SM 2 nd ed:p.16-18,SM	1/29	Sec.2 p.21-2,27-31,SM 2 nd ed:p.19-20,25-29,SM
4	2/3	Sec.2 Post HW2 p.66-7,22,33-43,SM 2 nd ed:p.62-3,20,31-40,SM	2/5	Sec.2 HW1 due p.33-43(cont'd),46-9,SM 2 nd ed:p.31-40(cont'd),43-47,SM
5	2/10	Sec.2 p.23,54-61,64-5,SM 2 nd ed:p.21-2,51-58,61-2,SM	2/12	Sec.3 Return HW1 p.74-81,SM 2 nd ed:p.71-78,SM
6	2/17	Sec.3 Post HW3 p.74-81(cont'd),82-8,SM 2 nd ed: p.71-78(cont'd),79-84,SM	2/19	Sec.3 HW2 due p.95-105 2 nd ed:p.91-101
7	2/24	Sec.3 p.89-95 2 nd ed:p.85-91	2/26	Sec.3 Return HW2 p.110-14,136-9 2 nd ed:p.106-109,130-133
8	3/2	Sec.4 p.144-7 2 nd ed:p.138-141	3/4	Exam 1
9	3/9	Sec.4 Post HW4 p.147-53,157-8 2 nd ed:p.141-146,151-2	3/11	Sec.4 HW3 due p.159,(161-2),162-70 2 nd ed:p.152-3,(154-5),155-63
10	3/16	SPRING	3/18	BREAK
11	3/23	Extended break	3/25	Extended break
12	3/30	Sec.4 SM	4/1	Sec.4 HW3 Graded p.173-183 2 nd ed:p.166-76
13	4/6	Sec.5 p.253-8 2 nd ed:p.243-249	4/8	Sec.5 Post HW5 HW4 due p.259-60,23,264-7 2 nd ed:p.249-250,22,254-57
14	4/13	Sec.5 p.267-71 2 nd ed:p.257-61	4/15	Sec.5 HW4 Graded p.271-2,276-8 2 nd ed:p.261-2,265-268
15	4/20	Sec.6, Post HW6 p.293-5,299-301 2 nd ed:p.281-83,287-89	4/22	Exam 2
16	4/27	Sec.6 HW5 due p.295-300,302,306-10,347-8,SM 2 nd ed:p.283-87,289-90,293-297,332-3,SM	4/29	Sec.6 p.348-50,359,310-14,SM 2 nd ed:p.333-5,342,297-301,SM
Wednesday, May 6: HW6 due, Final Exam 5:00pm-7:45pm				

Homework Assignments

Homework will consist of both a theoretical component (15%) and computational component using MATLAB (15%). Assignments will be posted at least every two weeks, and due dates will be shown on the assignment. You will be notified by UTD email and eLearning announcements when an assignment is posted.

Theoretical assignments:

As usual, these will be posted in eLearning. You will be asked to upload handwritten work (or type it in by hand) for the theoretical portion into eLearning. If you do not have a scanner, you can download the free Adobe Scan app to your smartphone. This allows you to take pictures of your work and merge them into one pdf, which you can then upload into eLearning. (Details given in each assignment.) Problems on each theoretical assignment may

be randomly graded. You may help one another on the theoretical problems, but the final product should be yours, and not a copy of others' problems, or parts of problems.

Programming assignments will be submitted in MATLAB Grader, which is set up so that you can rerun the programs until a selected set of test variables are correct. These are the variables that will be graded by MATLAB Grader. You can rerun and retest your programs as many times as you like before the indicated deadline. The number of actual submissions may be limited. The scores on the problems will be averaged to compute the score for each MATLAB assignment.

The lowest theoretical assignment grade will be dropped and the remaining grades will be used to compute the theoretical HW average referenced below; the lowest MATLAB assignment grade will also be dropped and the remaining grades will be used in the MATLAB HW average referenced below. Late HW will NOT be accepted – just submit what you have completed on the due date. This is one reason why one assignment of each category will be dropped.

Exams:

The remaining exams, Exam 2 and the Final Exam, will be submitted in eLearning. Details as to the format will be given at a later date, but they may be in multiple choice format. Unless otherwise noted, the times will be the same as those previously scheduled (see schedule).

Please double-check these withdrawal dates on www.utdallas.edu:

1/13-1/29	Students may withdraw from a class without record.
1/30-2/24	Students may withdraw from a class with signatures and receive a W.
2/25-3/26	Students may withdraw from a class with signatures of instructor <u>and</u> advisor receiving a WL.
3/27-EOT	Students may withdraw from a class for non-academic reasons only.

Grading Policy

Theoretical HW Average	15%
MATLAB HW Average	15%
Exam 1	20%
Exam 2	20%
Final Exam	30%

(Wednesday, May 6, 5:00-7:45pm)

Grade Scale	[96.6,100]...A+	[93.3,96.6).....A	[90,93.3).....A-
	[86.6,90).....B+	[83.3,86.6).....B	[80,83.3).....B-
	[76.6,80).....C+	[73.3,76.6).....C	[70,73.3).....C-
	[66.6,70).....D+	[63.3,66.6).....D	[60,63.3).....D-
	[0,60).....F		

Course & Instructor Policies

Exams/assignments:

- You will be notified of the due dates when the assignments are given. Late HW will NOT be accepted – just submit what you have completed on the due date.
- I will accept handwritten assignments as long as they are neat and well-organized with problems in the correct order.
- Any programs must be well-documented - you must be able to explain your code.
- There will be no make-up exams.
- Exams are closed book and with only scientific calculators. I may allow you to bring one 8 1/2 X 11 sheet of notes.
- SHOW ALL WORK on exams and assignments. Unsupported answers are considered miracles and, while inspirational, will receive little or no credit. Midterm exams and assignments will be returned to you as soon as possible. Any document not picked up by the end of finals week will be destroyed.
- Final exams are not returned to the student but are held for review for one year.
- It is essential that you attend all lectures to be successful in this class.
- There will be **no** extra credit

Academic Conduct:

Academic dishonesty is taken very seriously and will not be tolerated in this class in any form. Academic misconduct includes willfully cheating on or giving aid during an exam or copying homework assignments (from the web, from each other, or from a solutions manual). Blatant copying on an exam, homework assignment, or computer assignment may result in a grade of zero for that work. You are encouraged to discuss the homework assignments with other students in the class. However, it is

expected that the homework you submit for grading will be written up by you alone (this includes computer programs which must not be duplicates of programs other students turn in). Further information on the academic conduct policy can be found at <http://www.utdallas.edu/deanofstudents/dishonesty/>

Citizenship:

Any action that disturbs your classmates or interrupts the lecture is unacceptable. Examples of such actions are:

- (a) Entering the classroom late - be as punctual as possible.
- (b) Leaving the classroom before break or before the end of lecture.
- (c) Cell phones, ringers, buzzers, beepers, alarms, raspberries, blackberries - turn them off! - unless you are a member of an emergency response team.
- (d) Student participation in class is desired, however, please raise your hand to speak and avoid having side conversations with your classmates.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same: "As a Comet, I pledge honesty, integrity, and service in all that I do."

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to <http://go.utdallas.edu/syllabus-policies> for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.