

Syllabus for ME2060

Numerical Methods – Fall 2021

Instructor: Dr. Robin Cunningham
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Office hours: M 10 am -12pm
T 11-12, 1-3:30
W 10 am – 12 pm
or By Appointment

Zoom: <https://unc.zoom.us/j/6876648904>

Assistant: Liuchao Jin
E-mail: windbirdman@stu.scu.edu.cn
Weekly Tutorial: (To be determined in class)

Liuchao will arrange the class QQ and may provide other means for you to contact him.

Lectures: Monday 13:50-16:25 in Room 3-104

Course URL: learn.scupi.cn

DESCRIPTION: This course is designed for students in mathematics, science, or engineering. Topics include numerical methods for solving nonlinear equations, direct and iterative methods for solving linear systems of equations, numerical approximations and interpolations, numerical differentiation and integration, numerical methods for solving initial value problems for ordinary differential equations, and a few other topics.

COURSE OBJECTIVES: Students will develop a good understanding of the concepts and theories of numerical methods for various mathematical problems and their applications. Students will be able to apply the concepts and techniques to solve applied problems.

COURSE STUDENT LEARNING OUTCOMES: The course is designed to provide a foundation in both computational and theoretical numerical methods. At the conclusion of the course, students will be able to

- Perform various methods for solving equations with one or more variables.
- Perform numerical differentiation and numerical integration and their applications.
- Solve differential equations IVP and BVP.
- Understand the convergence of various numerical methods for various applications.
- Understand the concept of algorithms for numerical methods.
- Be able to write computer code for given algorithms of numerical methods.
- Be able to analyze the results from computer programs of numerical methods.

PREREQUISITE: Math0280 or equivalent

Materials and Websites for the Class:

Textbook: Burden and Faires: *Numerical Analysis, 9th edition*.

Gradescope: Homework will be handed in on Gradescope. You can find our class at gradescope.com by scrolling to the bottom of the welcome screen and using the class code: **5V22EJ**

We will talk more about this in class, but in the meantime, you will want to read at Gradescope about how to hand in assignments. **Please use your SCU email to sign up.**

Programming Requirement: Throughout the course, we will be taking advantage of MATLAB for certain small pieces of code that implement the algorithms we learn in class. Weekly tutorial will be used for MATLAB help and we will have a lesson in how to download MATLAB in the first couple of classes.

GRADE: The final grade will be based on the **score**, which is a number between 0 and 100 determined by

Homework/Quizzes: 20% Computer projects: 15% Major Tests: 40% Final Exam: 25%

The final letter grade is determined from the following table.

A: 90 – 100	A-: 85 – 90	B+: 80 – 84	B: 76 – 80	B-: 73 – 76
C+: 70 – 73	C: 66 – 70	C-: 63 – 66	D: 60 – 63	F: < 60

HW Assignments:

- You should do all homework assignments. It is your obligation to make sure you understand how to do those assignments correctly. I will grade homework assignments based on completeness only, not on correctness. Homework assignment solutions will be provided a week after the assignments are given.
- On homework, it is ok to work with others, but the work you turn in **should be yours alone. Please do not copy-paste code from other students, this is easily detected and defeats the purpose of the homework.**
- A good general rule for getting help with computer code: **It is ok for someone to look at your code and offer suggestions. It is generally not ok for you to simply read another person's code.**
- Also, it is generally fine to use what you find is available on the internet.
- The most important rule for homework (or life) is to give attribution when you use someone else's work. Just give them credit. Then there is no way to get into an awkward situation.

Quizzes and Exams:

Quizzes and Exams are required and in general, make-ups are not available. Missing one quiz will not impact your grade significantly, but if you miss three, you may notice an impact on your final grade.

There are three major monthly tests and a final exam. Each major test will emphasize material since the previous exam, but may include anything covered previously. The lowest test score may be replaced by the final exam score if the final is higher. Example: if a student's grades are: QZ(85), ICW(80), tests (70, 80, 75), and final (78), then the lowest test score 70 is replaced by 78. Thus, the student grade determination is $85 \times 15\% + 80 \times 10\% + (75+80+78)/3 \times 45\% + 78 \times 30\% = 79.1$ which is a B. The final exam will be comprehensive. There is **NO** Make up for all the exams. Tentative exam dates are the following:

RECITATION: We will decide a common time for a 50-min recitation every week for answering your questions. **Some quizzes** may be held during recitation.

ATTENDANCE: You are expected to attend all the classes. I will check the attendance but will not be used toward your grade. A student who misses a class is responsible for finding out what was covered in the class.

NON-ACADEMIC MISCONDUCT: All cell phones and other electronic devices are to be turned off and out of sight while you are in the classroom (I will follow the same rule!). All newspapers and other materials not related to the class are to be put away once class begins. Operating these devices and reading unrelated materials while in class is disrespectful of your instructor and fellow classmates. If you have an emergency and need to have your phone turned on during class, ask your instructor for permission.

TENTATIVE TOPICS:

1. Test1 Period:
 1. Chapter 1: 1.1
 2. Chapter 2: 2.1 – 2.5
 3. Chapter 3: 3.1 – 3.4
2. Test2 Period:
 1. Chapter 4: 4.1 – 4.7
 2. Chapter 5: 5.1 – 5.6
3. Test3 Period:
 1. Chapter 10: 10.1 – 10.4
 2. Chapter 8: 8.1 – 8.6
4. After Test3:
 - a. Chapter 9: 9.1 – 9.2
 - b. Chapter 11: 11.1 – 11.4