ME2060: Numerical Methods
Monday Class, Spring Semester, 2020

INSTRUCTOR: Dr. Tsun-Zee Mai;
OFFICE: Rm 4-224; **EMAIL:** tmai@scu.edu.cn
OFFICE HOURS: During Online period: Monday 5:00 – 6:00pm.
When classes are resumed regularly: Mon, Wed, Thur: 9:00 – 11:00am at Rm 4-224, or by appointment.
LECTURES: Mondays 1:50pm – 4:30pm at Rm 3-102
TEXTBOOK: Burden and Faires: *Numerical Analysis, 8th edition*.
PREREQUISTIES: Math0280 or equivalent.
DESCRIPTION: This course is designed for students in mathematics, science, or engineering. Topics include various numerical methods for solving nonlinear equations, direct and iterative methods for solving linear systems of equations, numerical approximations and interpolations, numerical differentiation and integrations, and numerical methods for solving initial value problems for ordinary differential equations, and other numerical methods in practices and theories.
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 codes for given algorithms of numerical methods.
- Be able to analyze the results from computer programs of numerical methods.

GRADE: Evaluation of students will be determined by homework and tests.
The final grade will be based on the **score**. The score is a number between 0 and 100 determined by
Homework: 15% Computer Projects 20% Major Tests: 40% Final Exam: 25%
The final letter grade is determined from the following table.

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

EXAMS: It is assumed that we can come back to campus for the majority part of the semester, then we will have three major 90min 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. Here is an example: if a student's grades are: HW (80), Projects (85), tests (70, 82, 85), and final (78), then the lowest test score 70 is replaced by 78. Thus the student grade determination is $80 \times 20\% + 85 \times 10\% + (78+82+85)/3 \times 45\% + 78 \times 25\% = 79.25$ 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:

EXAM 1: TBA	EXAM 2: TBA
EXAM 3: TBA	FINAL: TBA

HOMEWORK: Homework and computer assignments will be given in the lectures. Due dates for each assignment will also be given. You must turn in the assignments on the due dates. NO late assignment will be accepted.
ACADEMIC HONESTY: Some amount of cooperation in program writing and debugging is allowable and is helpful in learning. However, the final product must be substantially the work of individual student. You may discuss and cooperate on general strategies for solving programming problems. However, construction of detailed algorithms (in whatever form) and actual coding must be done independently. Feel free to help

each other but do not rewrite or copy each other's code. Discussion of broad generalities for solving problems on the homework is allowable but these assignments are to be substantially independent work. All work turned in should be done independently and not copied from others or worked in groups.
ATTENDANCE: You are expected to attend all the classes; however I will not check the attendance. A student who misses a class is responsible for finding out what was covered in the class. Note that some test problems may come from your homework and/or examples worked in the class.

TENTATIVE TOPICS:

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