

MATH 417 – NUMERICAL METHODS SECTIONS 502 – SPRING 2020

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Classes: TR 11:10am-12:25pm in BLOC 163 (via Zoom starting March 24)
Labs: W 01:50pm-02:40pm in BLOC 133 (via Zoom starting March 25)
Office hours: TR 09:00am-10:00am in BLOC 608P, or by appointment (via Zoom starting March 24)

Textbook:

Numerical Analysis, 10th edition, by R. Burden, J. Faires and A. Burden (ISBN: 978-1-30-525366-7). Earlier editions (7th, 8th and 9th) are very similar and can also be used.

Catalog Description:

Numerical methods for applications; qualitative discussion of convergence and stability properties; computer implementation; interpolation and quadrature, initial value problems, matrix decompositions, interactive solution of linear and non-linear systems, least squares approximation, boundary value problems for ordinary differential equations.

Prerequisites: MATH 304, MATH 309, MATH 311, or MATH 323; MATH 308; ability to program; junior or senior classification.

Course Objectives:

This course is an introductory survey of numerical methods that are used in science and engineering. We will analyze properties such as accuracy, efficiency and stability of classical numerical approximations. The homework will include programming exercises to gain practical experience using the methods introduced in class.

Course Outline and Schedule (tentative):

This course will cover the following topics from the textbook.

Chapters	Sections	Duration
2. Solutions of Equations in One Variable	2.1-2.4	1.5 weeks
3. Interpolation and Polynomial Approximation	3.1, 3.3-3.5	2 weeks
4. Numerical Differentiation and Integration	4.1-4.4, 4.7	2 weeks
6. Direct Methods for Solving Linear Systems	6.1-6.6	2 weeks
7. Iterative Techniques in Matrix Algebra	7.1-7.3	1 week
9. Approximating Eigenvalues	9.1-9.3, 9.6	1.5 weeks
8. Approximation Theory	8.1-8.2	1 week
5. Initial-Value Problems for ODEs	5.1-5.4	1.5 weeks

Homework and Quizzes:

Homework assignments will be posted on the course website throughout the semester. Assignments will consist of analytic and programming exercises. Python is the preferred language for this class. The problems designated as *Hand-in* are to be turned in on the assigned due date (via eCampus starting March 26). You are encouraged to work with others while solving homework problems, but you must write up your own solutions. Moreover, late homework will not be accepted except in the case of an excused absence (see the section “Attendance and Make-up Policy” below).

In-class (via Zoom starting April 2) quizzes (closed book, closed notes and no electronic devices) with problems related to the assigned homework will be given on a biweekly basis, usually on Thursdays. You will not have to turn in any homework solution for the material covered by the quizzes.

There will be about 6 hand-in homework assignments and 5 quizzes throughout the semester.

Exams:

There will be one in-class midterm exam (75 minutes) and one final comprehensive exam (2 hours). A detailed description of the material covered by each exam will be given on the course website in due time. Moreover, the final exam will most likely be proctored using Zoom but the exact procedure is still being worked out.

Grading Policy:

The final grade will be based on the homework/quizzes, the midterm exam and the *comprehensive* final exam. It will be computed according to the following distribution:

- Homework/Quizzes: 35% of your grade;
- Midterm: 30% of your grade;
- Final exam: 35% of your grade.

The homework and the quizzes will be weighted equally. Moreover, the two lowest grades will be dropped. Homework, quiz and exam scores will be posted on the eCampus webpage. Your *minimum* final grade will be A, B, C, or D, for averages of 90%, 80%, 65% and 50%, respectively.

Important Dates:

January 14	First day of (this) class
February 27	Midterm exam
March 9-13	Spring Break
April 14	Q-drop deadline (05:00pm)
April 23	Last day of (this) class
April 30	Final exam (03:00pm-05:00pm)

Attendance and Make-up Policy:

Attendance is STRONGLY recommended. Make-ups for missed exams will only be allowed for a university approved absence in writing. Wherever possible, students should inform the instructor before an exam is missed. Consistent with University Student Rules, students are required to notify an instructor by the end of the next working day after missing an exam. Otherwise, they forfeit their rights to a make-up. For more information, see <http://student-rules.tamu.edu/rule07>.

Make-ups will NOT be given for quizzes. However, if you miss a quiz due to an authorized absence and you contact me immediately then the missed quiz will not count.

Academic Integrity:

The Aggie Honor Code An Aggie does not lie, cheat or steal, or tolerate those who do applies, see also the Honor Council Rules and Procedures at <http://aggiehonor.tamu.edu>. Students

are strongly encouraged to work together and discuss homework problems with each other. However, copying or stealing work done by others is an act of academic dishonesty and will be persecuted according to the University policy.

Materials Copyright:

All materials generated for this class are protected by Copyright laws. Distributing copies or sale of any of these materials is strictly prohibited.

Americans with Disabilities Act (ADA):

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit <http://disability.tamu.edu>.

Title IX and Statement on Limits to Confidentiality:

Texas A&M University and the College of Science are committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws provide guidance for achieving such an environment. Although class materials are generally considered confidential pursuant to student record policies and laws, University employees - including instructors - cannot maintain confidentiality when it conflicts with their responsibility to report certain issues that jeopardize the health and safety of our community. As the instructor, I must report (per Texas A&M System Regulation 08.01.01) the following information to other University offices if you share it with me, even if you do not want the disclosed information to be shared:

- Allegations of sexual assault, sexual discrimination, or sexual harassment when they involve TAMU students, faculty, or staff, or third parties visiting campus.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In many cases, it will be your decision whether or not you wish to speak with that individual. If you would like to talk about these events in a more confidential setting, you are encouraged to make an appointment with the Counseling and Psychological Services (<https://caps.tamu.edu/>).