Numerical Analysis    MATH 5339.001
Department of Mathematics & Statistics
Fall 2020

A. COURSE INFORMATION

Course number/section: MATH 5339.001
Class meeting time: MWF 12:00 noon - 12:50
Class location: OCNR 118
Course Website: https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION

Instructor: Dr. Beate Zimmer
Office location: CI 310
Office hours: MWF 11:00 – 11:50 AM
             TR 9:15 AM – 10:05 noon
Telephone: (361) 825-2682
e-mail: beate.zimmer@tamucc.edu
Appointments: e-mail to make appointments outside the announced office hours

C. COURSE DESCRIPTION

Catalog Course Description

Extended Course Description
This course will deal with the basic concepts of Numerical Analysis and the foundations of numerical algorithms. We will cover some of the main topics of Numerical Analysis like: computer arithmetic, solutions of nonlinear differential equations, approximations of functions, numerical differentiation and integration and numerical solutions of differential equations. The student will use the computing environment MATLAB to write and run codes to see how these algorithms work. They will also compare these codes with professional codes.

D. PREREQUISITES FOR THE COURSE

Prerequisites
Prerequisites: MATH 3311, MATH 3315, MATH 3470, MATH 4315; also COSC 1435 or COSC 5311 or equivalent.

Corequisites
none
E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

Optional Textbook(s) or Other References
The library has a wide selection of Numerical Analysis textbooks.

Supplies
The University has a license for MATLAB, you can use it campus computers. Current students, faculty, and staff are covered by the campus-wide license which now allows them to software on their personal Windows, Mac, or Linux computers. To do so, go to https://it.tamucc.edu/it-training/matlab.html

This class is planned as a face to face class. This may change. In that case you may be required to have a webcam and there may be a cost for online proctoring of exams. The cost can be up to $50 per exam.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. Use the floating point arithmetic in the computers
2. Recognize the different problems studied in Numerical Analysis
3. Distinguish among different methods to solve a particular problem determining advantages and disadvantages
4. Write codes for several of the numerical methods introduced in the class
5. Use the codes to solve typical problems
6. Interpret the solutions computed by the algorithms
7. Solve problems in the following areas: nonlinear equations, interpolation of functions, numerical differentiation and integration, ordinary differential equations, and linear programming.

Students will also learn to use the MATLAB computational environment to implement and use the algorithms from class.
G. INSTRUCTIONAL METHODS AND ACTIVITIES

Methods and activities for instruction include: Lectures, computer demonstrations and discussions.

H. MAJOR COURSE REQUIREMENTS AND GRADING

The methods of evaluation and the criteria for grade assignments are the scores on the homework assignments, hour exams and the final exam. The hour exams are written exams, a basic calculator is permitted. Homework is assigned weekly and is due on Wednesdays at the start of the class unless the instructor has announced a different deadline. Working with other students is fine, but be sure to turn in your own product in the end. Office hours are a great opportunity to ask more questions about homework. Late homework receives no credit. The lowest homework grade gets dropped. No exam grades get dropped. The Final exam is comprehensive.

Calculator policies and partial credit:
You may use a basic scientific calculator for the exams. All exams and the homework assignments do have partial credit. Exams are written exams, unless the class delivery mode changes to online. In that case the exams may become oral exams and the final exam may be replaced by a final project.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Three exams</td>
<td>60%</td>
</tr>
<tr>
<td>Homework</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
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</tbody>
</table>

Grading Scale: Grades will be no stricter than
A = 90.00 – 100%
B = 80.00 – 89.99%
C = 70.00 – 79.99%
D = 60.00 – 69.99%
F = below 60%

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 W 8/19</td>
<td>Taylor’s Theorem, Orders of Convergence</td>
<td>1.0 – 1.2</td>
</tr>
<tr>
<td>2 F 8/21</td>
<td>Difference Equations</td>
<td>1.3</td>
</tr>
<tr>
<td>3 M 8/24</td>
<td>Floating Point Numbers</td>
<td>2.0 – 2.1</td>
</tr>
<tr>
<td>4 W 8/26</td>
<td>Absolute and Relative Errors</td>
<td>2.2</td>
</tr>
<tr>
<td>5 F 8/28</td>
<td>Stability, Conditioning</td>
<td>2.3</td>
</tr>
<tr>
<td>6 M 8/31</td>
<td>Nonlinear Equations: Bisection Method</td>
<td>3.0 – 3.1</td>
</tr>
<tr>
<td>7 W 9/2</td>
<td>Newton’s Method</td>
<td>3.2</td>
</tr>
<tr>
<td>8 F 9/4</td>
<td>Secant Method</td>
<td>3.3</td>
</tr>
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</table>
The comprehensive Final Exam is on Monday, December 7, 11:00 AM – 1:30 PM.

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

COVID-19
Face Coverings—Face coverings (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Extra masks will be made available if needed.

**Attendance/Tardiness**

Masks are required for all classes and labs. In lectures, students may remove the mask once seated as long as social distance is maintained, and the instructor may remove the mask while delivering the lecture and maintaining social distance. Masks must be replaced and worn when leaving lecture rooms. Instructors and students must keep masks in place for the duration of labs due to the close interactions. Extra masks will be made available if needed. Attendance will be taken each class. For most students attending class is a faster way of learning the material than trying to catch up on missed material solely from the book. Tardiness is often disruptive to the whole class and is not appreciated. If you are delayed and arrive late for class please do so quietly. Usually the topic/technique of the day is introduced in the first few minutes of class; missing that part usually means that you will be lost all class.

**Late Work and Make-up Exams**

Missed homework assignments can not be made up; the drop grade accommodates those. Make-up exams will not be given. If a student misses an exam and has a valid excuse, the final exam score will serve as the score for that exam. Only one exam can be replaced by the final, all other missed exams count as zero points.

**Extra Credit**

There is no extra credit in this class.

**Cell Phone Use**

Cell phones and such must be turned off before class. Each time your phone rings during class, your course grade goes down by 1%.

**Laptop Use**

You may use a laptop to take notes during lecture. Distracting other students by surfing the web is not acceptable behaviour.

**Food in Class**

No food in class (except during the final, where non-noisy foods are OK).

**Missed Exam**

If you have to miss an exam, it is your responsibility to contact me no later than the day of the exam. Failure to contact me on or before the exam day results in a grade of zero points for the exam. This also applies to the final exam. For missed final exams due to an acceptable excuse the university rules about I (Incomplete) grades apply and the make-up is at the instructor’s convenience early in the next long semester. Only extreme emergencies or official university business are acceptable reasons to miss exams.
and documentation will be required. Car trouble, routine doctor’s appointments, family reunions or graduations of siblings etc. are not valid reasons to miss exams. If your reason to miss the exam is not a valid one, your exam score is 0 points. Be sure to check before missing an exam whether your reason is acceptable.

**Participation**
Participation is not part of the grade, but you learn more by interacting, than by watching passively.
K. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior** Texas A&M University–Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University–Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **Deadline for Dropping a Course with a Grade of W (University)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar [http://www.tamucc.edu/academics/calendar/] for the last day to drop a course.

- **Grade Appeals Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C0.03, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures,
or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is required to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C0.03, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://academicaffairs.tamucc.edu/rules_procedures/assets/13.02.99.c0.03_student_grade_appeals.pdf](http://academicaffairs.tamucc.edu/rules_procedures/assets/13.02.99.c0.03_student_grade_appeals.pdf). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  
  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 call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

  If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

  [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

- **Civil Rights Complaints**
  
  Texas A&M University-Corpus Christi is committed to fostering a culture of caring and respect that is free from discrimination, relationship violence and sexual misconduct, and ensuring that all affected students have access to services. For information on reporting Civil Rights complaints, options and support resources (including pregnancy support accommodations) or university policies and procedures, please contact the University Title IX Coordinator, Sam Ramirez (Samuel.ramirez@tamucc.edu) or Deputy Title IX Coordinator, Rosie Ruiz (Rosie.Ruiz@tamucc.edu) x5826, or visit website at Title IX/Sexual Assault/Pregnancy.

- **Limits to Confidentiality**
  
  Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the University’s student record policies. However, students should be aware that University employees, including instructors, are not able to maintain confidentiality when it conflicts with their responsibility to report alleged or suspected civil rights discrimination that is observed by or made known to an employee in the course and scope of their employment. As the instructor, I must report allegations of civil rights discrimination, including sexual assault, relationship violence, stalking, or sexual harassment to the Title IX Coordinator if you share it with me.
These reports will trigger contact with you from the Civil Rights/Title IX Compliance office who will inform you of your options and resources regarding the incident that you have shared. If you would like to talk about these incidents in a confidential setting, you are encouraged to make an appointment with counselors in the University Counseling Center.

• **Statement of Academic Continuity**
  In the event of unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi this course would continue through Blackboard and/or e-mail. In addition the syllabus and class activities may be modified to allow continuation of the course. University Facilities (i.e. e-mail, web sites, and Blackboard) will be operational within two days of closing the physical campus. However, students need to make certain that the course instructor has a primary and secondary way of contacting each student.

**L. OTHER INFORMATION**

• **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.