COSC-3385, NUMERICAL METHODS
FALL 2020

A. COURSE INFORMATION

   Course Number/Section:         COSC 3385.001
   Class Meeting Time & Location: Fully Online
   Course Website:                bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

   Instructor:                   Dr. S. M. Mallikarjunaiah
   Office Location:              CI-316
   Office Hours:                 M 10am-11am, TH 2:00pm - 3:00pm, F 1:00pm-3:00pm;
                                 Online using Webex
   Telephone:                    +1-(361)-825-3187
   e-mail:                       m.muddamallappa@tamucc.edu
   Appointments:                 Contact me by e-mail to set up an appointment

C. COURSE DESCRIPTION

   Catalog Course Description
   This course introduces concepts for solving problems numerically using computers. Students will learn about number systems, errors of finite representation, and iteration. A survey of basic numerical methods including: solutions to nonlinear equations, solutions to linear systems, approximation, interpolation, zeros of functions, numerical differentiation and integration, and Monte-Carlo methods.

   This course is required for COSC System Programming and Game Programming majors and for Mathematics majors.

D. PREREQUISITES FOR THE COURSE

   Prerequisites
   Prerequisites: MATH 2413 - Calculus-I, COSC 1330 - Programming for Scientists, Engineers, and Mathematicians or COSC 1435 - Introduction to Problem Solving with Computers-I.

   Recommended: MATH 2414 - Calculus-II and MATH 3311 (Linear Algebra) and MATH 3315 (Differential Equations) are recommended.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

   Required Textbook(s)

Optional Textbook(s) or Other References
None.

Supplies
Laptops/Computers, Webcam, Network (regular access to high speed internet), camscanner app on mobile phones or any other gadget to scan quiz/exams. This course requires the use of Respondus LockDown Browser and a webcam to monitor the online exams. The LockDown browser will prevent you from accessing other websites or applications during an exam while ensuring the integrity of the exam. These systems require students to confirm their identity, and, during the exam, the system monitors students through video. The webcam can be the type that's built into your computer or one that plugs in with a USB cable.

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 courses 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:

☞ Be familiar with finite number systems in computer arithmetic.
☞ Understand the differences between fixed and variable precision.
☞ Be familiar with elementary numerical methods.
☞ Be able to estimate error of a numerical solution.
☞ Gain experience in numerically solving problems such as polynomial roots, computing derivatives, computing definite integrals, solving linear systems, interpolating data, solving ODEs and PDEs.

Assessment of objectives will be conducted through exams and homework assignments.

G. INSTRUCTIONAL METHODS AND ACTIVITIES
ONLINE CLASS: The whole course will be taught ONLINE with pre-recorded videos. The lecture videos will be posted to blackboard twice a week (on Tuesdays and Thursdays morning). All Assignments and Tests will be given online.

H. MAJOR COURSE REQUIREMENTS AND GRADING

The expected learning outcomes for the course will be assessed by homeworks/programming projects, two mid-term exams, and a comprehensive final exam.

Homeworks: Homeworks will be assigned weekly. Students will be informed by the instructor via Blackboard (https://bb9.tamucc.edu) about the assignments, which should be completed before the given deadline (generally within a week). Do not wait until the due date to start your assignment. Work on the problems daily. Your work should be legible and neat. If the work is not presentable, you will NOT receive credit for it.

Final grade: Homeworks, and tests are counted towards the final grade with weights as follows:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>30%</td>
</tr>
<tr>
<td>2 Midterm Exams</td>
<td>40%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
</tbody>
</table>

Based on the above, grades will be assigned according to the following scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Average</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>90-100</td>
</tr>
<tr>
<td>B</td>
<td>80-89</td>
</tr>
<tr>
<td>C</td>
<td>70-79</td>
</tr>
<tr>
<td>D</td>
<td>60-69</td>
</tr>
<tr>
<td>F</td>
<td>0-59</td>
</tr>
</tbody>
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I. COURSE CONTENT/SCHEDULE

Important Dates:

- Mid Term I Thursday, October 1.
- Mid Term II Thursday, November 19.
- Final Exam, December 1 – 5, (Date and time will be announced later)

Course Outline:
• Week 1 : Mathematical preliminaries
• Week 2 : Floating Point Representation
• Week 3, & 4 : Locating roots
• Week 5, 6, & 7 : Interpolation, Numerical differentiation, MID TERM EXAM-I
• Week 8 : Numerical integration
• Week 9 : Linear Systems
• Week 10, 11 & 12 : Matrix factorization and iterative methods for system of equations
• Week 13 : Spline functions
• Week 14 : Least Squares (MID TERM EXAM-II)
• Week 15 : Review and Thanks giving Holidays
• Week 16: Final Exam: December 1-5, 7 (Exact date/time will be announced later)

Note: Changes in this course schedule may be necessary and will be announced to the class by the instructor. The assignments and 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. This course moves very fast. If you fall behind, even by one section, you may not be able to catch up, since each section generally depends very heavily on the ones before. Make sure to watch all lecture videos.

Late Work and Multiple Submissions:
Assignments is not accepted after the deadline. There are no make ups for the examinations, except for reasons of illness, stated in writing by the medical doctor. Failure to contact me on or before the exam day results in a grade of 0 points for the exam. This also applies to the final exam. For missed final exams due to an acceptable ex-cuse, the university rules about I (Incomplete) grades apply and the make-up is at the instructors 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.

Extra Credit: There is no extra credit in this class.

Calculator: Calculators are not required.
Grading: On mid terms and final, partial credit for correct steps will be awarded even if the final answer is wrong. Full credit will be given only if the final answer and all intermediate steps are correct. A correct final answer per se does not guarantee any credit.

Incompletes: A grade of I (Incomplete) will only be given in exceptional circumstances, such as a death in the family or personal injury that might prevent someone from taking the final test. In this case, it is the responsibility of the student to notify me as soon as possible, preferably by e-mail, and to complete the required Incomplete Form available from the University Registrar. If this is not done, a score of 0% will be assigned for any incomplete tests and a final grade will be computed using the criteria described above. This course moves very fast. If you fall behind, even by one section, you may not be able to catch up, since each section generally depends very heavily on the ones before. So make sure to watch the video lecture.

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/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

- **Grade 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.

- **Statement of Academic Continuity**

  In the event of an 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 the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means 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 Colleges 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 and also by e-mail to the class.