COSC 3385 - Numerical Methods
Department of Computing Sciences
Spring 2016

A. COURSE INFORMATION

Course number/section: COSC 3385.001
Class meeting time: TR 9:30-10:45AM
Class location: BH-126
Course Website: bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: George Tintera
Office location: CI 303
Office hours: MW 9-10 AM; MTWR 11 AM – Noon
Telephone: 361-825-6028
e-mail: george.tintera@tamucc.edu
Appointments: as arranged by email

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 AND COREQUISITES

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 are recommended

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
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. be familiar with finite number systems in computer arithmetic,
2. understand the differences between fixed and variable precision,
3. be familiar with elementary numerical methods,
4. be able to estimate error of a numerical solution,
5. gain experience in numerically solving problems such as polynomial roots, computing derivatives, computing definite integrals, solving linear systems, interpolating data, solving ODEs and PDEs.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

This course will be a mixture of lectures, discussions, and demonstrations. The student is expected to actively participate in all class activities. The student is also expected to do outside work on assignments and to complete several pieces of software.

H. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Midterm</td>
<td>25</td>
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<tr>
<td>Final</td>
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<td>Assignments</td>
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<td>Quizzes and Class Participation</td>
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I. COURSE CONTENT/SCHEDULE

The following is a tentative schedule and may change.
Background: computer arithmetic; rounding errors, machine precision, machine representation, unsolvable problems, Taylor's series.

1-2

Fixed point iteration. notes

4

Root finding.

5

Polynomials: synthetic division, roots. notes

6

Systems of linear equations.

7

Interpolation

8

Differentiation

9

Integration

10

Monte Carlo Integration

11

Solving ODEs

12

Approximation

13

Review/Advanced Topic

14

Final Exam

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

Attendance/Tardiness

- Most quizzes are at the beginning of class for the first 5 minutes, if you are late, you may miss the quiz entirely or have less time to complete it.

Late Work and Make-up Exams

- No makeup exam without adequate doctor's excuse explaining your absence. Makeup exams will not be the same exam. If for any reason you have a conflict you must see me as soon as you know about the conflict!
- Late assignments will be marked off at a rate of: 10% for 1 day, 25% for 2 days, 60% for 3 days, 100% thereafter

Extra Credit
• Each lab has opportunity for extra credit which counts towards the assignments, and can spill over into your final grade.

Cell Phone Use

• Turn off cell phones and pagers before class. If any cell phone goes off in class, even mine, it is quiz time.

Others

• Incompletes only with documented reasons in accordance with the university policy.
• All work must be your own, group work is CHEATING, and all group members will receive a zero
• Unless otherwise noted, the due time will be 11:59:59PM, 12:00:01AM is 10% off.

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)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation **WILL NOT** automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. 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.C2.01, 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 encouraged 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.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage at [http://sci.tamucc.edu/students/GradeAppeal.html](http://sci.tamucc.edu/students/GradeAppeal.html). 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/)
• **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 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.