I. COURSE INFORMATION

Instructor: Dr. Pablo Tarazaga
Office Phone: 825-3187
Office Address: CI 316
E-Mail Address: pablo.tarazaga@tamucc.edu
Office hours: TR 10:00 to 12:00
M 10:00 to 11:00

Meeting Time and Place: Math 5339.001 MWF 9:00-9:50 IH-156

II. 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 equations, approximation of functions, numerical differentiation and integration and numerical solutions of differential equations. The student will use the computing environment Matlab to run codes to see how these algorithms perform. They will also compare these codes with professional codes.

III. PREREQUISITES

MATH 3311, MATH 3470, MATH 3315 and COSC 1435 or COSC5311

IV. TEXT AND OTHER SUPPLIES REQUIRED

V. COURSE LEARNING OUTCOMES

- Students will be able to:
  - Use the floating point arithmetic in the computers
  - Recognize the different problems studied in Numerical analysis.
  - Distinguish among different methods used to solve a particular problem determining advantages and disadvantages
  - Write codes for several of the numerical methods introduced in the class.
  - Use the codes for solving typical problems
  - Interpret the solutions computed by the algorithms.
  - Solve problems in the following areas: nonlinear equation, interpolation of functions, numerical differentiation, integration and ordinary differential equations.

- Students will also learn to use Matlab computational environment to numerically:
  - Solve nonlinear equations
  - Interpolate function using polynomials
  - Interpolate function using splines.
  - Compute accurate numerical derivatives.
  - Estimate integrals.
  - Solve ordinary differential equation using a variety of methods.

VI. INSTRUCTIONAL METHODS AND ACTIVITIES.

The class uses lecture format encouraging student participation and discussion. Using the computing environment provided by Matlab, student will develop their own codes for some algorithms and they will compare the performance with Matlab and other codes.

VII. EVALUATIONS AND GRADE ASSIGNMENTS

- All the work done in the class will be part of your final grade (assignments, codes tests and final exam). I will evaluate very carefully the learning objectives.
- There will be two kinds of assignments:
  - First, problems from each section of the book that we cover during the course, they will not be collected (most problem in the tests will be similar to them).
A second class of assignment will consist in writing Matlab codes for the methods we describe in class; these assignments will be collected and graded.

- The table below shows the weight of each of the items considered to determine your grade.
- All tests will contain a part on techniques and a part on understanding and basic proofs.
- Final exam will be comprehensive.

<table>
<thead>
<tr>
<th>Assignments (codes): 20%</th>
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<tbody>
<tr>
<td>Test #1</td>
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<tr>
<td>Test #2</td>
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<tr>
<td>Final exam:</td>
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Your final grade will be determined using the following scale:
A: 90%-100%, B: 80%-89%, C: 70%-79%, D: 60%-69%, F: 0%-59

VIII. TENTATIVE COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
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<tbody>
<tr>
<td>8/27</td>
<td>Preliminaries and review of key mathematical concepts.</td>
</tr>
<tr>
<td>9/1</td>
<td>Floating point arithmetic.</td>
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<tr>
<td>9/15</td>
<td>Basic methods for nonlinear equations.</td>
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<tr>
<td>9/22</td>
<td>Fixed points and functional iteration. Roots of polynomials.</td>
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<tr>
<td>9/29</td>
<td>Interpolation and Polynomial interpolation.</td>
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<tr>
<td>10/6</td>
<td>Basic methods, Divided defferences and Hermite Interpolation.</td>
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<tr>
<td>10/13</td>
<td>Spline interpolation.</td>
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<tr>
<td>10/20</td>
<td>Numerical differentiation based in interpolation.</td>
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<tr>
<td>10/27</td>
<td>Gauss quadrature, Romberg integration.</td>
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<tr>
<td>11/3</td>
<td>Adaptive methods in Integration.</td>
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<tr>
<td>11/10</td>
<td>Euler and Taylor methods for initial value problems.</td>
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<td>11/17</td>
<td>Runge-Kutta methods.</td>
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<tr>
<td>11/24</td>
<td>Additional methods.</td>
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<tr>
<td>12/1</td>
<td>Multistep methods.</td>
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<tr>
<td>Dec 8</td>
<td>FINAL EXAM (8:00 – 10:30)</td>
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IX. CLASS POLICIES

- Attendance: It will not be part of your grade, but it is required. Exceptions are sickness and emergencies.

- I do expect that you come to each class ready to learn and to participate. Also you have to be prepared to do any required work. You are expected to devote for each hour of class between two and three hours outside the class working in the subject (some people need more time than others).

- Late work: In general, I accept homework up to a week after the deadline, there will be a 10% late penalty.

- Grades: After you receive your grades you have up to a week to dispute it. I am the person you can dispute your grade with.

- If at any point in the semester you are considering to drop the class, talk to me before you do it. I am here to help you in your learning experience and to help you to succeed in your college career.

- PLEASE TURN YOUR CELLULAR PHONES OFF. DO NOT USE THEM DURING THE CLASS. DO NOT DISTURB THE CLASS WITH THEM. KEEP IT IN YOUR POCKET OR IN YOUR BAG.

Academic Integrity/Plagiarism

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 grade zero.

Dropping a Class

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 me before you decide to drop to be sure it is the best thing to do. 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. July 25, 2014 is the last day to drop a class with an automatic grade of “W” this term.

**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 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.

**Grade Appeals**

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, and the College of Science and Engineering Grade Appeals webpage (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.

**Disabilities Accommodations**

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 or visit Disability Services at (361) 825-5816 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.

**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.