SCHOOL OF ENGINEERING AND COMPUTER SCIENCE

CSE 330 – NUMERICAL METHODS

In this course we learn about how computers and computer programs can assist in mathematical modeling, problem solving and simulation.

Spring/2016
Section 1 and 6
[Class Meeting time(s)]

Instructor: Hakikur Rahman, UB40303, hakikur.rahman@bracu.ac.bd
Office Hours: TBA

I. Rationale:

Numerical Methods is at the intersection of Applied Mathematics and Computer Science, and focuses on how computer programs can be leveraged efficiently to model real-world problems, numerically solve calculus problems and perform simulations that enable us to design better artifacts like bridges and buildings. Knowledge of numerical algorithms is also essential in developing simulation software like, AutoCAD.

II. Course Aims and Outcomes:

Aims

Students will learn about the different problems that need to be modeled mathematically, algorithms that can help us build and solve such models, and learn to compare among the different algorithms existing for a single problem. In the lab, students will become familiar with the popular high level mathematical toolkit Matlab.

Specific Learning Outcomes:

By the end of this course, students will:

a) Implement several numerical approximation algorithms that can be used to solve mathematical models of real world problems
b) Compare different candidate solutions to a numerical approximation problem
c) Implement algorithms in Matlab
d) Perform numerical approximation calculations manually and compare the results from different algorithms

III. Format and Procedures:
The course is structured as two lectures per week, each of duration 80 minutes. In addition, there is a weekly 3 hour lab session that is mandatory for students, and contributes towards 20% of their final grade. Students are expected to be punctual in class, and participate actively through questions and discussion. Bear in mind that participation will be a big portion of your final grade, and simply attending the lectures without any visible engagement will not be of much help. All students are expected to be civil and ensure an environment where everyone feels safe to voice their questions and comments.

IV. My Stance (Need a short section here on teaching/learning methods to be used)
Given the densely mathematical nature of the course, most of the classes will be modeled as lectures given by the instructor, juxtaposed with questions and clarifications from the students. Students will be required to do a significant amount of reading. For best results, students should read the textbook prior to coming to class, participate actively in the lecture, and revise the topics once they go back from class. A list of topics to be covered, along with an expected timeline, will be provided in class in order to facilitate this. Details about the textbook will be discussed in class.

V. Course Requirements:

1. Class attendance and participation policy: While attending lectures and being punctual is mandatory, just passively sitting in class will not be conductive to learning. Students are expected to ask questions and are encouraged to have discussions in class about the material being covered. This will be done a lot more productively if students read the textbook prior to coming to class, and also review material already covered in class once they are back home.

2. Course readings:

a) Numerical Methods with Applications - Autar K Kaw
b) Lecture slides will be periodically posted on TSR

VI. Grading Procedures:

a) Final – 30%
b) Midterm – 20%
c) Quiz – 20%
d) Lab – 20%
e) Homework – 5%
f) Participation – 5%

Participation marks will be decided based on number of lectures attended, punctuality of arrival, and proportion of questions and comments made during lecture.

VII. Academic Integrity
Each student in this course is expected to abide by the BRAC University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student's own work.
You are encouraged to study together and to discuss information and concepts covered in lecture with other students. You can help out or receive help from other students in the form of consultation and guidance. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e-mail, an e-mail attachment file, or any form electronic or hard copy.

If copying occurs, both the student who copied work and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Code can also be extended to include failure of the course and University disciplinary action.

During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, and you may not compare answers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.

VIII. Accommodations for students with disabilities

I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances, so arrangements can be made.

IX. Tentative Course Schedule

Topics Assignment	Readings to be discussed
January 10 Solving non-linear equations	Chapter 3, Lecture slides from TSR
January 17 Solving non-linear equations	Chapter 3, Lecture slides from TSR
January 24 Solving Systems of linear equations	Chapter 4, Lecture slides from TSR
January 31 Solving Systems of linear equations	Chapter 4, Lecture slides from TSR
February 7 Methods of Interpolation	Chapter 5, Lecture slides from TSR
February 14 Methods of Interpolation	Chapter 5, Lecture slides from TSR
February 21 Midterm Review and exam	Review past exams and class test problems
February 28 Regression Analysis	Chapter 6, Lecture slides from TSR
March 6 Numerical Differentiation	Chapter 2, Lecture slides from TSR
March 13 Numerical Integration	Chapter 7, Lecture slides from TSR

March20 Ordinary Differential Equations	Chapter 8, Lecture slides from TSR
March 27 Ordinary Differential Equations	Chapter 8, Lecture slides from TSR
April 3 Advanced Topics	TBA