Math 225 – Numerical Analysis

Spring 2010 Syllabus

Class Meetings: PPHAC 112, MWF 1:10-2:20pm
Text: *Applied Numerical Analysis using MATLAB* (2nd edition), by Laurene Fausett
Course Website: `http://math.moravian.edu/hartshorn/225`

Instructor: Kevin Hartshorn
Office Hours: PPHAC 215, MTuW 2:30-4:00pm, *or by appointment*
e-mail: `hartshorn@math.moravian.edu`

1 General Comments and Introduction

The purpose of this course is to introduce you to some basic numerical methods for finding approximate solutions to mathematics problems. Finding roots of equations, areas under a curve, best curves to fit given data, etc. are all techniques that are greatly aided with effective computer work.

While most computer languages can be employed to tackle the problems of this course, we will focus on using *Maple*[1] and class discussions will tend to focus on how to use *Maple* for solving these problems. There will be some minor programming called for in this course, but the focus is using the computer algorithms and scripts to gain a better understanding and appreciation of how to tackle real mathematical problems from a computational viewpoint.

2 Goals and Objectives

- Be able to select and apply basic numerical methods for solving problems.
- Be able to perform simple programming in *Maple*, including writing procedures, importing/exporting data to a file, and working with various data types.
- Be able to communicate new information both verbally and orally, including presentation of material to the class.

3 Course Format

Most of the class period will be conducted as a lecture, including illustration of *Maple* techniques related to the topic. Homework will consist mostly of problem sets from the text (including both mathematical and computing exercises), although several concrete projects/examples will also be included.

[1] While our text uses MATLAB as the core language, we will interpret the MATLAB code as psuedocode and implement all algorithms in *Maple*.

You will be asked to write some simple code for *Maple* and to present material to the class on two occasions. There will be three midterms and a final exam.

3.1 Homework problems

Homework will be due regularly. Homework is expected to be neat, organized, and clearly show all work. You are more than welcome to type your response, though a (neatly) handwritten response is also acceptable. All solutions should clearly indicate both the problem and the logical structure of the solution.

In completing your homework, feel free to use:

- Your text, class notes, or any material from the course web page.
- Any capabilities of *Maple* (except when specifically told otherwise).
- The *Maple* support page (http://www.maplesoft.com/support/help/).
- Consultation with the professor.
- Consultation with your classmates. Note that each person should write his or her own solutions. When asked to test procedures with your own data or functions, each person should include their own inputs.

You may not simply copy identical answers from each other's homework. You may not consult people or resources outside of class in completing your homework assignments.

3.2 Technology

Many homework problems will require the use of *Maple*. Procedures and sample files will be posted on the class web page (http://math.moravian.edu/hartshorn/225/). Any material posted on the site may be used in completing homework.

Note that the textbook uses MATLAB. We will interpret MATLAB code as pseudocode, and implement all algorithms in *Maple*. During class, I will provide frequent demonstrations of *Maple* programming.

Those familiar with Python may opt to experiment with the software *Sage*[2], which is a Python-based freeware alternative to *Maple*. I will accept solutions sets using either platform. Note that *Sage* is not installed on campus computers, but may be freely downloaded to install on your own machine.

3.3 Oral presentations

Everyone will be asked to give two presentations on topics that extend the core discussion of the course. On Friday, February 26 and on Friday, April 30, each person will discuss a topic of their choice.

[2] http://www.sagemath.org/

Your discussion will include a handout for the class, some problems to assign, and a short oral presentation. Details for these presentations will be provided as the first date draws near.

3.4 Exams

There will be three exams. One will be an oral exam during the week of February 15, one will be a take-home exam during the week of March 22, and the format for the third exam will be determined after the Spring break. The third exam will take place the week of April 12.

The scheduled time for the final exam is Friday, May 7 at 8:30am. The format for the final exam will be discussed after the Spring break.

4 Grading and Assessment

The components of the course will be weighted as shown in the table below.

30%	Homework submissions
20%	Presentations and discussion
30%	Exams (3 exams)
20%	Final Exam
100%	**Total**

Generally speaking, your final course grade translates to a letter grade loosely based on the standard 4-point system: generally 85% marks the difference between an "A" and a "B", 70% marks the difference between a "B" and a "C", 60% marks the difference between a "C" and a "D", and any score below 50% is considered failing. Note that these numbers are meant only as a guideline and are subject to change over the course of the semester. See the Student Handbook[3] for a qualitative description for the various grades.

5 Attendance and other Issues

5.1 Attendance

While I expect you to attend every session, unavoidable situations will arise during the semester. This course does not have an official attendance policy. However, keep in mind the following:

- If your homework is not turned in on the date due, you will get a zero for that assignment, regardless the reason for your absence. If you know that you will be missing a class, it is your responsibility to get the homework to me.

[3] http://www.moravian.edu/studentLife/handbook/academic/academic.html

- At the end of the course, I will drop the 3 lowest homework scores. In a sense, you are given three "excused" absences.
- If you know that you will miss a class that requires your presence (e.g.: one of the days for class presentations), let me know as soon as possible so that other arrangements can be made.
- While any *Maple* worksheets will be posted on the class web page, it is your responsibility to get class notes from either myself or from your classmate if you miss class.

5.2 Final reminders and disclaimers

- Everyone is expected to adhere to Moravian College's Academic Honesty policy, as described in the Student Handbook[4].
- *Visit my office!* I would love to hear feedback about which aspects of the course are or are not going well. You have a great deal of power to determine the path this class takes – take advantage of it.

  You can also reach me by e-mail (hartshorn@math.moravian.edu).
- This syllabus is subject to change through the semester. The most recent version of the syllabus can be found at http://www.math.moravian.edu/hartshorn/225/.
- Final determination of your course grade is subject to my discretion as professor of the course.

[4]http://www.moravian.edu/studentLife/handbook/academic/academic2.html