

MATH 272 - Applications of Numerical Methods

Winter 2010

Instructors: Alan Ableson, Juancho Collera

Email: math272@mast.queensu.ca

Course web site: <http://www.mast.queensu.ca/~math272/>

An introductory course on the use of numerical algorithms in science and engineering applications. Topics include: solving linear and nonlinear equations, interpolation, integration, and numerical solutions of ordinary differential equations. Extensive use is made of MATLAB, a high level interactive numerical package.

Textbook:

Numerical Computing with MATLAB, Cleve B. Moler, 2004, SIAM.

Web edition of the book is published by The MathWorks, Inc. It is available at

<http://www.mathworks.com/moler>

Software

MATLAB will be the software used in this course. It is available is JEFF 155 and JEFF 157 for free use. A student version is also available for purchase at the bookstore for approximately \$102.

Mark Distribution:

5 Lab Tests – 30% (6% each)

Project – 30% or 40%

Final Exam – 30% or 40%

- The Final Exam will be a 3 hour Lab Test. It will be scheduled during the exam period.
- Project and Final Exam grades will be assigned 30/40 split, whichever is higher.

NOTE: The formula above applies **only** to those students who **pass the final exam**. If you fail the exam, every mark below 50 will weight the project less by 2%, and the final exam by that much more.

Example:

Lab Test Average: 16/30, Project: 52/60, Final Exam: 40/100

Exam mark is below 50, by 10 marks. Since project mark is higher, we use the 30/40/30 test/project/exam split to start. Project can contribute at most $40 - 2(10) = 20\%$ to the overall grade, exam is worth 20% more, or $30 + 20 = 50\%$.

$$\text{Final mark is } \underbrace{30 \times \left(\frac{16}{30}\right)}_{\text{Tests}} + \underbrace{20 \times \left(\frac{52}{60}\right)}_{\text{Project}} + \underbrace{50 \times \left(\frac{40}{100}\right)}_{\text{Final Exam}} = 53\%$$

Parts of the course

- **Lectures** will focus on the background and theory of the course material. **Active use of MATLAB will be part of the lectures, so a laptop is recommended for class**
- **Labs** will be for students to practice for the lab tests and get help from the TAs. The lab time will *not* be sufficient to complete all the assignment/test preparation problems, and students will have to spend some of their own time working on the assignments.
- **Tutorial** time will be used for MATLAB introduction for weeks 2 and 3, and bi-weekly tests thereafter.

Rules and Regulations

- All tests are mandatory, and can only be missed through pre-arrangement, or due to illness. Notification by email is expected within 2 days of the missed test in the case of illness.
- Missed tests will not be re-taken; the 6% for the test will added to your final exam.
- In the tests and exam, only the resources inside MATLAB and those provided explicitly in the test itself can be used. No web sites, communication tools, electronic or paper reference materials can be used without explicit permission.
 - First violation on a test: Zero on **two** tests, informing the Faculty.
 - Second violation on a test, or violation in the exam: zero for the course, informing the Faculty.

Project

- The project is a group project, which will start around the 4-5th week of class, with final submissions early in the last week of class.
- Up to 4 students can be part of a group; larger groups can be arranged with permission
- The project is broken into 3 software development Phases, and then a set of 3 design challenges.
- The mark for the project will be computed as:
 - 10 marks each for the 3 software development Phases (30 marks)
 - 15 marks each for the design challenges (best 2 designs taken, 30 marks)

General Notes

- The skill you are to master in this course is to have programs that run correctly and solve a problem. Since “running” is a necessary part of this, submitting scripts and programs that don’t run will be given half marks at most.
- “Running correctly” is the second goal, and it is distinct from just “running”. You are expected to think about your results, and are encouraged to comment on strange properties in your solutions when you notice them. If you submit contradictory or clearly unreasonable answers to a question without any comment, expect penalties.
- Following instructions correctly is important: marks can be deducted for not providing what was asked for on tests and the project.