MATH/CS 514
Numerical Analysis
TTh 1:30pm-2:45pm, REC 121
http://www.math.purdue.edu/~mleok/courses/ma514.html

Instructor	Prof. Melvin Leok, Department of Mathematics Office: MATH 430, phone: (765)496-3578, email: mleok@math.purdue.edu
Office Hours	TTh 3pm-4:30pm, MATH 430
Prerequisites	CS 314 or its equivalent, and a good knowledge of MATLAB.
Textbook	*Numerical Analysis: Mathematics of Scientific Computing*, David Kincaid and Ward Cheney, Third Edition, Brooks/Cole, 2002.

Additional Reading

For more exercises: R.L. Burden and J.D. Faires. *Numerical Analysis, 8th Edition*. Brooks/Cole, 2004.

For a more gentle treatment: B. Bradie. *A Friendly Introduction to Numerical Analysis*. Prentice-Hall, 2006.

For a concise but rigorous treatment: E. Süli and D.F. Mayers. *An Introduction to Numerical Analysis*. Cambridge University Press, 2003.

For more theory: E. Isaacson and H. B. Keller. *Analysis of Numerical Methods*. Dover Publishing, 1994.

For more MATLAB examples: C.B. Moler. *Numerical Computing with MATLAB*. SIAM, 2004.

Computer Language

MATLAB (MATrix LABoratory)

- This software is available in computer labs around campus.
- Student version can be purchased for home PC (**NOT REQUIRED).**

Goals of the Course

1. Understand how approximation of functions yield numerical methods for approximately solving problems from **continuous mathematics** on the computer
2. Implement these methods in a computer language (MATLAB)
3. Apply these methods to application problems

Course Topics

1. Mathematical Preliminaries (Chap. 1)
2. Computer Arithmetic (Chap. 2)
3. Solution of Nonlinear Equations (Chap. 3)
4. Approximating Functions (Chap. 6)
5. Numerical Differentiation and Integration (Chap. 7)
6. Numerical Solution of Ordinary Differential Equations (Chap. 8)

Grading

30 % – 10 Homework assignments

20 % – 3 Computer projects

20 % – 1 Midterms (1 hour 15 minutes, in-class, 1 cheat sheet, front and back, no calculators)

30 % – 1 Final Exam (2 hours, in-class, 1 cheat sheet, front and back, no calculators)

HOMEWORK POLICY	**NO LATE** homework will be accepted. Homework will be due at the **BEGINNING** of class.
COLLABORA-TION POLICY	Homework is an essential part of advanced mathematics courses. Most students will find that some problems will require repeated and persistent effort to solve. This process is an integral component of developing a mastery of the material presented, and students who do not dedicate the necessary time and effort towards this will compromise their understand of the material in this course, and their ability to apply this material in their subsequent work.

A student may after working conscientiously on a problem for over 30 minutes, consult with other current Math/CS 514 students to develop and clarify their approach to the problem. The written solution should however be an independent and individual effort that reflects the students understanding of the problem and its solution.

As a general guide, a student should be able to independently reproduce any solution that is submitted as homework. Copying of solutions is not permitted and is considered a violation of these guidelines, which will automatically result in zero credit for the assignment, and be reported to the graduate chair of the appropriate department.