MA/CS 321 – Introduction to Numerical Methods
University of Kentucky, Department of Mathematics
Spring 2018

Instructor Information:

Instructor: George Lytle

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Office Hours: W 9:00AM-10:00AM POT 702,

TR 9:30AM-10:30AM, POT 702,

Other times available by appointment.

Meeting Times: MWF 11:00AM - 11:50AM, CB 345

Course Web Page: `http://www.ms.uky.edu/~ghly222/teaching`

Textbook: *Numerical Mathematics and Computing*, 7th Ed. by Ward Cheney & David Kincaid

Prerequisites: MA 114 and Knowledge of a Procedural Programming Language (C/C++, Java, Python, or MATLAB) is required.

Course Goals:

- To introduce students to algorithms that are commonly used in science and engineering.

- To familiarize students with error estimates in the context of analyzing code.

- To understand the mathematics behind common algorithms.

Student Learning Outcomes: After completing this course students should be able to:

- Estimate computed errors

- Select/propose methods that yield small errors (if possible)

- Analyze results computed in floating-point arithmetic

Outline: This semester, we will cover topics in the following areas.

- Algorithms, number systems, errors and error propagation

- Roots of nonlinear equations.

- Linear system solutions (direct and indirect methods)

- Interpolation

- Numerical Differentiation

- Numerical integration

- Initial value problems

Grading: Each of the following will be discussed in further detail below. The weights of each component are given in addition to the final grading scale:

Attendance/Participation	5%	A	90%-100%
Homework	50%	B	80%-89%
Midterm Exam	20%	C	70%-79%
Final Exam	25%	D	60%-69%
		E	0%-59%

Attendance and Participation: A portion of your grade will be determined by attendance and participation. This class is interactive, and so both are expected (i.e., attend class regularly without arriving late or leaving early, complete any in-class assignments, actively participate in the lesson). You will not be penalized for excused absences (including illness, death of a family member, university excused absences, religious holidays, and any other circumstances which that Instructor of Records finds reasonable as per University Senate rule 5.2.4.2).

If you are absent one day and have appropriate documentation, please relay to me in person the necessary information within a week of your most recent absence (or email me with documents detailing the absence). At that point, we will discuss when you can make up any work you may have missed.

Homework: A key part of this course is the problem sets and homework. Problem sets will be assigneed for each topic and will require extensive analysis and a thorough 'write-up.' Communication skills are vital for the applied mathematician in a team environment, so I will grade your reports for grammar and communication effectiveness as well. Homework write-ups will be done in LaTeX. I will also occasionally assign online homework via Webwork at

$$\texttt{https://webwork.as.uky.edu/webwork2/MA321S18/}$$

This link is also on the course webpage.

Exams: There will be a midterm exam and a final exam. If you need an alternate exam, please follow university policy to obtain one. If you miss an exam, provide proof of your hopefully university excused absence, and we will find a time for you to makeup the exam. If you know in advance that you will be missing an exam, please let me know as soon as possible (with excuse at the ready!). The midterm exam will occur after the material on linear systems and is *tentatively* scheduled for March 2. The final exam is scheduled for Tuesday, May 1 at 10:30AM.

Quizzes: Each Friday a quiz may be given on material from previous lectures and reading. The quiz grade will contribute toward your Attendance/Participation grade.

Deadlines: A due date will be assigned for each homework set. Online homework will close at the deadline. When you submit your assignment, put the date on the page. There will be a 10% penalty for each late day to a maximum of 50%. So, after five late days (county only M-F), you may still turn in your assignment, but you will only receive a maximum of 50% credit for that work. Homework sets covered during the midterm exam will not be accepted after the midterm is administered.

Academic Integrity, Cheating, and Plagiarism: You should feel free to study with friends, but any work you submit for a grade should be your own work. This applies to

all exams, quizzes, and writing assignments, with the exception of any assignment that is specifically designated as a group assignment.

Academic dishonesty, in any form, will not be tolerated. This includes, but is not limited to, copying a classmate's work, allowing a classmate to copy your work, modifying an exam after it has been handed back in an attempt to deceive the instructor into believing the assignment was graded incorrectly. A student found guilty of academic dishonesty will receive an automatic E on the assignment, and in some cases the offense may lead to an E for the course, academic probation, or even expulsion. See sections 6.3.1 and 6.3.2 at www.uky.edu/StudentAffairs/Code/part2.html for more information regarding academic integrity.

Disability Accommodations: If you have documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Suite 407, Multidisciplinary Science Building, 859-257-2754, email address dtbeac1@uky.edu) for coordination of campus disability services available to students with disabilities.

Classroom Behavior, Decorum, and Civility: In order to promote a healthy learning environment, I expect all students to be respectful to all members of our learning community. The university, college and department has a commitment to respect the dignity of all and to value differences among members of our academic community. There exists the role of discussion and debate in academic discovery and the right of all to respectfully disagree from time-to-time. Students clearly have the right to take reasoned exception and to voice opinions contrary to those offered by the instructor and/or other students (S.R. 6.1.2). Equally, a faculty member has the right—and the responsibility—to ensure that all academic discourse occurs in a context characterized by respect and civility. Obviously, the accepted level of civility would not include attacks of a personal nature or statements denigrating another on the basis of race, sex, religion, sexual orientation, age, national/regional origin or other such irrelevant factors. Students who are not respectful, not civil, or disruptive in any way may be asked to leave the class, with all subsequent penalties applied to their grade.

How to Study for This Class: Since this course will not have daily homework assigned, it is different from many math courses. The keys to success in this course are *note review* and *early jump on the problem sets*. Like any math course, it requires 4-5 study sessions per week to stay current (excluding class time). Usually, working exercises forces students to put in this time. You'll need to be more disciplined in this course. Review each day's notes carefully, and plan to put in about an hour working on the problem set in each study period. I'm giving a lot of weight to these problem sets because they require a lot of work. You will *not* be able to complete them in one or two cram sessions. Additionally, working on the problem set each day will give you the chance to bring in problems or unusual results for us to discuss in class. Since note review takes on more importance - learn the material in class and practice it on the sets. Don't wait to learn the topic as you prepare to do the homework.