Math 410

Introduction to Numerical Methods

Fall Semester 2022

Professor: ***Vianey Villamizar*** **Class: 11:00 - 11:50 a.m. MWF 121 TMCB**
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Web page: www.math.byu.edu/~vianey

Office Hours: Monday 1:00 – 2:00 p.m. (office), Friday 4:00-6:00 p.m. at XX TMCB

Teaching Assistant: ***Raelynn Wonnacott***

Text: Numerical Analysis, Tenth Edition, R. Burden and J. Faires, Cengage Learning 2016.

Week #	Date	Sections	Comments
1	Aug 29 – Sep 2	Intr -2.1, 2.2, 2.2	**Work Hard, Enjoy, and Have a Great Semester!**
2	Sep 5 – Sep 9	2.3, 2.3	Monday Sep 5: Labor Day Holiday **Friday Sep 9: Programing Project is due** **Tuesday Sep 6: Last day to drop the class w/o W**
3	Sep 12 – Sep 16	2.4, 10.2, 2.6	
4	Sep 19 – Sep 23	3.1, 3.1, 3.2	**Monday Sep 19: Project 1 is Proposed**
5	Sep 26 – Sep 30	3.3, 3.4, 34-3.5	
6	Oct 3– Oct 7	3.5, 3.6, 8.1	**Monday Oct 3: Project 1 is Due**
7	Oct 10 – Oct 14	8.2, 8.2, 4.1	
8	Oct 17 – Oct 21	4.2, 4.3, Review	***Midterm*** **Oct 21– 22 (Fr – Sat).**
9	Oct 24 – Oct 28	4.3, 4.4, 4.6	**Wednesday Oct 26: Project 2 is Proposed**
10	Oct 31 – Nov 4	4.7, 4.8, 4.8	
11	Nov 7 – Nov 11	6.1, 6.1	**Monday Nov 7: Project 2 is Due**
12	Nov 14 – Nov 18	6.2, 6.3, 6.5	
13	Nov 21 – Nov 25	6.6, 6.6	Tuesday Nov 22: Friday Instruction **Nov 23-25 Thanksgiving Holiday**
14	Nov 28 – Dec 2	7.3, 7.3, 7.4	
15	Dec 5 – Dec 9	Reviews	Dec 9: Exam Preparation Day
16	Dec 12 – Dec 16	Final Exam	**Final Exam at 121 TMCB:** **Thursday Dec 15, 11:00 am - 1:00 pm (Classroom)**

Prerequisite: Math 314: Multivariable Calculus

Objectives: To give the students a practical introduction to modern approximation techniques, and to provide a basis for future study of numerical analysis and scientific computing. Theoretical aspects are also studied so that students can recognize when is appropriate to use certain methods and understand the quality of the results produced. Numerical methods are extremely useful in all areas of engineering, as well as in physical, biological, and social sciences. I believe that my role as your instructor is to help and to assist you in the process of learning mathematics. I will do my best to fulfill this role. I know that you will enjoy this class as

you go along by making a consistent effort throughout the semester. **My best advice to you is found in D&C 4:2 replacing the first line by ... O ye that embark in Math 410, see that ye work with all …**

Programming: The treatment is software oriented. It is recommended that students have a previous programming experience with any programming language. Also, all weekly homework will include problems that require the use of computer codes to obtain their solutions. You are encourage to use the book MATLAB codes found at:

https://sites.google.com/site/numericalanalysis1burden/module-7/matlab

I have also posted examples of MATLAB codes, corresponding to some of the numerical methods to be studied in this class, on my web page at:

www.math.byu.edu/~vianey

Most demonstrations in class will be done in MATLAB. I highly recommend you to get some expertise in its use and syntaxes. It will enable you to increase your understanding of the concepts to be taught in Math 410 and it will be a most valuable tool for any math application to real world problems.

Homework: Homework consists of four to six written problems per Section. We will use the Gradescope platform to collect your weekly homework**.** I will give you separate instructions for doing it.
You should be willing to put in at least two to three hours outside the classroom for each hour of class. **I expect that you do not work on your homework during the class period**. Late homework will not be accepted. To make up for this, one week of homework (the one with the lowest grade) will be dropped. Discussion of homework assignments is encouraged, but you should keep in mind that homework is an individual work. Programming varies from person to person. It is a very personal activity. After your study and discussion with your classmates, you should be the only creator of your codes

Each homework set should contain problems from only one section of the text. Homework problems to be graded will be chosen among the whole set of problems. Incomplete homework will receive partial credit according to the amount of problems worked out.

Exams: There will be a Midterm and a Final exam during the following days:

- Midterm 1 – Friday October 21-Saturday October 22 (Testing Center)
- Final Exam – Thursday December 15 (in our regular classroom 121 TMCB)

The Midterm exam will be based on the material (theory and homework problems) covered until the previous Monday. The final exam will be comprehensive. Some questions will be like those discussed in class, or those assigned as homework. Other questions will be based on the subject matter discussed in class and in the text, but otherwise will be unlike any you have seen before. *If you are able only to do problems like those you have seen before, you are doing an average work. To earn a better grade, you need to understand the concepts and different techniques, and be able to solve new and interesting problems.* **The Midterm exam will be given in the testing center, but the final will be in our regular classroom 121 TMCB.**

Make up exams cannot be arranged except in case of an emergency or absence due to official university business. **Exam dates will be strictly enforced.** The University Final Exam Policy states: **"Scheduled final examinations are to be administered in accord with the published Final Examination Schedule as to date, time, and place. They are not to be given or taken early."** Only basic scientific calculators (no graphic or symbolic ones) will be allowed in all exams. No books and no other notes will be allowed.

Grading: Grades will be based on cumulative points earned as follows:
Homework 30 %, Midterm 20 %, First coding project 5%, Projects 10 % each (2 in total), Final 25 %.
At the end of the semester, **I will compute your grade based on each one of the above forms of evaluations with their corresponding weights. Then, a Gaussian curve will help me to determine your final grade**. In any event, the Gaussian curve will not hurt your grade. I will guarantee the following letter grades:

	B+ = 89-87%,	C+ = 79-77%,	D+ = 69-67%,	
A = 100-93%,	B = 86-83%,	C = 76-73%,	D = 66-63%,	E = 59-0%
A- = 92-90%,	B- = 82-80%,	C- = 72-70%,	D- = 62-60%.	

Keep in mind that a good grade is the result of a good learning process. All of you can get a good grade by successfully experiencing this learning process.

Honor Code: In keeping with the principles of the BYU Honor Code, students are expected to be honest in all of their academic work. Academic honesty means, most fundamentally, that any work you present as your own must in fact be your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university. Students are also expected to adhere to the Dress and Grooming Standards. Adherence demonstrates respect for yourself and others and ensures an effective learning and working environment. It is the university's expectation, and my own expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have questions about those standards.

Sexual Harassment: Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education and pertains to admissions, academic and athletic programs, and university-sponsored activities. Title IX also prohibits sexual harassment of students by university employees, other students, and visitors to campus. If you encounter sexual harassment or gender-based discrimination, please talk to your professor or contact one of the following: the Title IX Coordinator at 801-422-2130; the Honor Code Office at 801-422-2847; the Equal Employment Office at 801-422-5895; or Ethics Point at http://www.ethicspoint.com, or 1-888-238-1062 (24-hours).

Student Disability: Brigham Young University is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have any disability, which may impair your ability to complete this course successfully, please contact the University Accessibility Center (UAC), 2170 WSC or 422-2767. Reasonable academic accommodations are reviewed for all students who have qualified, documented disabilities. The UAC can also assess students for learning, attention, and emotional concerns. Services are coordinated with the student and instructor by the UAC. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures by contacting the Equal Employment Office at 422-5895, D-285 ASB.

Respectful Environment: "Sadly, from time to time, we do hear reports of those who are at best insensitive and at worst insulting in their comments to and about others... We hear derogatory and sometimes even defamatory comments about those with different political, athletic, or ethnic views or experiences. Such behavior is completely out of place at BYU, and I enlist the aid of all to monitor carefully and, if necessary, correct any such that might occur here, however inadvertent or unintentional. "I worry particularly about demeaning comments made about the career or major choices of women or men either directly or about members of the BYU community generally. We must remember that personal agency is a fundamental principle and that none of us has the right or option to criticize the lawful choices of another." President Cecil O. Samuelson, Annual University Conference, August 24, 2010 "Occasionally, we ... hear reports that our female faculty feel disrespected, especially by students, for choosing to work at BYU, even though each one has been approved by the BYU Board of Trustees. Brothers and sisters, these things ought not to be. Not here. Not at a university that shares a constitution with the School of the Prophets." Vice President John S. Tanner, Annual University Conference, August 24, 2010

HOMEWORK ASSIGNMENTS
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Due Date	Sections	Problems	Due Date	Sections	Problems
Aug 31	2.1	6d, 8, 11abcd, 17, 19, 20			
Sep 2		"A Ceratin Idea of BYU" By Justin Collings			
Sep 7	2.2	6, 10, 11, 20, 21			
Sep 9		First Coding Project			
Sep 12	2.3	3, 6e, 8e, 13, 14 16			
Sep 14	2.4	1d, 2d, 4d, 5, 8ab, 6			
Sep 19	10.2	2ad, 3c, 5c, 8, 14			
Sep 21	2.6	2cd, 4cd, 6, 7, 8(bonus)			
Sep 26	3.1 3.2				
Sep 28	3.3				
Oct 3	3.4				
Oct 5	3.5				
Oct 10	3.6 8.1				

Remark: To emphasize some aspects not included in the above list of problems, I could make minor changes to these homework assignments during the semester.