Math 476: Numerical Analysis
Winter, 2015

Course Summary

This course is part of a year-long course sequence (Math 475, 476, and 477) that provide an introduction to many basic methods used in numerical analysis. The main topics may include: Iinterpolation and approximation of functions, numerical integration and differentiation, solution of non-linear equations, acceleration and extrapolation, solution of systems of linear equations, and computer programs applying these numerical methods.

By the end of this course you will be able to...

- Define numerical analysis.
- Write a technical report that presents your research findings and conclusions.
- Analyze the error propagation that results from mathematical algorithms.

Math 476 Course Outline

Chapter 3 (3.1-3.6)   Interpolation and polynomial approximations.
Chapter 4(4.1-4.8)   Numerical differentiation and integration.
Additional: We may cover additional special topics including sections 8.1-8.6 and 2.1-2.6, time permitting

In addition, in this class we will reinforce:

- Applying appropriate technology to solve problems;
- Working cooperatively with others;
- Problem solving skills,
    - Describe the methods used to approach a problem;
    - Read and understand complex mathematical problems;
    - Model phenomena mathematically;
- How to express solutions in written and oral form.
    - How to "speak math", and
    - How to use logic to justify mathematical ideas,

Contact Information

Instructor:	Brandy Wiegers, PhD
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Office:	Bouillon 107A
Phone:	(509) 963-2163

The best way to contact the instructor is at office hours or via email. Expect a 12-24 hour delay in response. If you haven't received a response within 24 hours of the original email please contact the professor again.

Syllabus Changes:

I reserve the right to change the policies contained in this syllabus as dictated by developments during the quarter.

Course Components

Course Prerequisites: To succeed in this course you will need to have mastered basic calculus (Calculus I and Calculus II). In addition, this is a mathematics course with a substantial programming component. The focus of the assignments is on the mathematical analysis of these programs. Any programming language can be used to complete the assignments but note that the programming component will only count for 30% of the grade of the assignment so plan to spend your time accordingly (i.e.: focus on the mathematical analysis!).
You will be successful in this course if you:

- Are self-motivated,
- Willing to work hard,
- Look for alternate ways of solving the same problem,
- Participate actively in group-work and class discussions,
- Ask questions, and
- Believe in yourself and your ability to learn and grow.

Class Meeting Time

Monday	2:00-2:50 PM	Hertz Hall 106
Wednesday	2:00-2:50 PM	Hertz Hall 106
Friday	2:00-2:50 PM	Lind Hall 113 - Physics Lab

Office Hours

MTWThF	1:10-1:50	Bouillon 107A

Office Hours may be changed to meet the needs of the class. Additional office hours are available via appointment, please email the instructor to schedule these meetings.

Text:

Numerical Analysis (9th Edition). RL. Burden & JD. Faires. Published by Brooks/Cole (Pacifica,CA). 2011. ISBN 9780538733519
Textbook website: `http://www.math.ysu.edu/?faires/Numerical-Analysis/`
Note: The previous (8th, 7th, 6th) editions contain the same discussion of the course material as the 9th edition but the homework problems are different in the new edition.

Course Website: http://www.cwu.edu/math/math-475

All course information including assignments and course project information will be available on the website.

Computer Access

Regular computing assignments will play a role in this course. If you do not have personal computer access make sure to start assignments early and make use of the CWU computing resources.

Grading

Final grades will be computed by assigning weights to homework, each of the exams, and the projects, as described below:

Midterm Exam   20%
Final Exam   20%
Homework   20%
Computer Assignments   40%

The following table reflects the planned letter grade for the course structure:

Total Score	100-93	92-90	89-87	86-83	82-80	79-77	76-73	72-70	69-67	66-63	62-60	59-0
Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

To track your progress in this course you should be comfortable calculating your own grade. Create a personal class folder to collect all your coursework. These will be needed to calculate your grade and will be useful when reviewing prior to exams. If you have questions about how to calculate your grade please visit the instructors in office hours.

Exams

Midterm Exam: Friday, February 13, 2015. During class, 1 hour.
Final Exam: Thursday, March 19, 2015, 12:00-2:00 PM, 2 hour.
You must be present at the final exam! Add it to your calendar now.

A missed exam will be given a zero and there will be no make-up exams. The only exceptions to this will be made completely at the discretion of the instructor and will only be granted for serious and compelling reasons. Please contact me ASAP to ensure the likelihood have having your issue taken seriously.

Homework

Homework will be assigned regularly and will be turned in at the beginning of class.
No late homework will be accepted without a university accepted excuse note.

Keeping up with the homework is one of the best things you can do to help yourself succeed in this course! Don't expect an email response to homework inquiries within 12 hours of the due date time. Start early and come to office hours.

Also, be aware that you will receive more partial-credit on exams for showing work. Practice communicating your understanding of the problem by writing problems out by hand.
Note: All written assignments must be typed or written in clear handwriting. If your instructors cannot read your work, they cannot grade it. You will get a zero on the assignment if it is illegible, is not stapled together, has frizzy edges, or does not have the following three pieces of information on it:

- Name

- Assignment #

- Date

Computational Projects

There will be 6 computational Projects, and all 6 will be counted toward your grade.
Students will be assigned to six computer projects throughout the course that will highlight the particular mathematical methods. You are welcome to write your code in any computer language that you feel comfortable with however, it must be a general purpose programming language that does not give any special assistance in implementing the algorithms we're studying. More information will be available on the website and in class.

DRAFT- Assignment Descriptions and Deadlines, subject to change

Assignment	Description	Due Dates
Project 7	Mathematica assignment Does not have to follow Assignment Format	January 14
Project 8	Cubic Splines	January 26
Project 9	Derivation Approximation	February 9
Project 10	Derivation Approximation (part 2)	February 23
Project 11	Integral Approximation	March 9
Project 12	Least Squares Approximation	March 19

Assignment Due Dates

Incomplete projects will NOT be accepted for credit. In order to receive full credit for an assignment, it MUST be completed and turned in by class time on the specified due date. Any assignment turned in late, but on or before the following class period will receive a maximum of one-half credit. Any assignment turned in after this date will not be graded and no credit will be given for it.

Assignment Format

To meet the learning objective of technical report writing, for each of the programming assignments you will write a brief technical report which answers the given questions and illustrates the fundamental ideas in clear, concise, descriptive English prose. The report should separate the required tasks of the given project and document each in the appropriate section, i.e. Analysis, Computer Program, or Results. **Refer to the Project Format Directions for more details on each section**.

Project Grading

Analysis, 30%
Computer Program, 30%
Results and Discussion, 30%
Style, 10% As you can see, the focus of the assignments is on the mathematical analysis of these programs, not the program. Please plan your time accordingly.

Collaboration

You are encouraged to talk to classmates about your computer assignments and other problems from classwork but you must complete all assignments by yourself. This means that you can discuss your algorithms as a group but you need to create individual codes and individual results. If you do talk with others please indicate who your group members were on your assignment.
Please be reminded that the Washington State Legislature defines Academic Dishonesty,
`http://app.leg.wa.gov/WAC/default.aspx?cite=106-120-027`

University Policies

Religious Holidays: Reasonable accommodations will be made for you to observe religious, holidays when such observances require you to be absent from class activities. It is your responsibility to inform the instructor during the first two weeks of class, in writing, about such holidays.

Academic Integrity: While completing this course you must follow the CWU Student Code of Conduct which is defined by Washington State. Please be reminded that the Washington State Legislature defines Academic Dishonesty in all its forms including, but not limited to the following:

- Cheating on tests.
- Copying from another students test paper.
- Using materials during a test not authorized by the person giving the test.
- Collaboration with any other person during a test without authority.
- Knowingly obtaining, using, buying, selling, transporting, or soliciting in whole or in part the contents of an unadministered test or information about an unadministered test.
- Bribing any other person to obtain an unadministered test or information about an unadministered test.
- Substitution for another student or permitting any other person to substitute for oneself to take a test.
- "Plagiarism which shall mean the appropriation of any other persons work and the unacknowledged incorporation of that work in ones own work offered for credit.
- "Collusion which shall mean the unauthorized collaboration with any other person in preparing work offered for credit.

For more details visit: `http://app.leg.wa.gov/WAC/default.aspx?cite=106-120-027`

Support Services/ Accommodations: Students who have special needs or disabilities that may affect their ability to access information and/or material presented in this course are encouraged to contact the office of Disability Support Services on campus (Bouillon 140 or- dssrecept@cwu.edu -or- 963-2171). Also, please let me know if you need me to accommodate for a disability in anyway, I am glad to do so!

Incompletes: The College Policy on Incompletes states that Incompletes are used when the student was not able to complete the course by the end of the term, but has satisfactorily completed a sufficient portion of it and can be expected to finish without having to re-enroll in it. In this course, students who have not completed substantial coursework should not assume that they will be given an incomplete at the end of the semester. If you have concerns about this you should talk to the course instructor and your academic advisor.

Important Dates:

Jan 12	Change of Schedule Period Ends (Add/Drop classes)
	(Drops completed prior to this date or by the close of business on this date will not appear on transcripts or have tuition assessed)
Jan 12	Deadline to declare audit & credit/no credit grading.
Jan 19	Martin Luther King Jr. Holiday, No class will be held.
Jan 28	Faculty Professional Development, No class will be held.
Feb 4	Deadline for 50% refund with complete withdrawal
Feb 16	President's Day Holiday, No class will be held.
Feb 20	Uncontested withdrawal period deadline
Mar 13	Withdrawal from classes or university.
	Not permitted except for "serious and compelling reasons."