

**Course Information - Math 450: Numerical Analysis - Section 01, Fall 2018**  
**4 Credits: MTWR 11:00-11:50a.m. Bridges Hall Room 268**

**Textbook:** *Numerical Analysis, 10th ed* by Richard L. Burden, J. Douglas J. Faires & Annette M. Burden, Cengage Learning

**Instructor:** Justin James, Mathematics Dept.

**Office:** MacLean 375M

**Office Phone:** 477-4011

**Office Hours:** MTWTh 1:00 – 2:00pm  
M W F 9:00 – 10:00am  
Other times by Appointment

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**Course Description:** Numerical solutions to systems of equations and differential equations, finite differences, interpolation formulas, numerical calculus, and approximating functions.

**Prerequisites:** In order to take Math 450, students must have successfully completed MATH 310: Discrete Mathematics (or MATH 311: Introduction to Proof and Abstract Mathematics), MATH 323: Multi-Variable and Vector Calculus, AND CSIS 152 - Introduction to Computers and Programming I-a.

**Major Content Areas:**

- Rounding methods, absolute and relative error, the definition of an algorithm.
- Methods for approximating roots of functions, error analysis and rates of convergence for these methods.
- Interpolation and approximation of functions (including finite difference methods), error analysis for these methods.
- Numerical differentiation and numerical integration techniques, error analysis for these methods.
- Approximating solutions to initial value problems, the definition of a well-posed problem, error analysis for these methods.

**Learning Outcomes:**

- Use numerical methods to find approximate solutions to a variety of real world problems.
- Understand the importance of verifying necessary hypotheses when using numerical methods to solve problems.
- Understand the importance of error analysis and be able to use error analysis to find a reasonable upper bound on the error when using numerical methods to solve problems.
- Develop multiple methods to solve the same type of problem and understand how to choose an appropriate method to use in a specific application.

**Instructional Strategies:** Lecture, group activities, in-class discussions, projects, group work, student presentations, and reflective writing.

**Course Requirements:** You are expected to complete all daily work, projects, assignments, and presentations, and to take and pass all exams and quizzes at their scheduled dates and times. During group activities, you are expected to actively contribute to completing the assigned activity.

**Attendance and Academic Expectations** Since discussion, in class activities, group work, and proof presentations are all key components of the design of this course, attending class regularly is of paramount importance. I will not directly penalize your grade for absences, but those who miss a group activity will be required to complete an alternate assignment in order to make up for any in-class assignments that they missed. If you are more than a few minutes late to class, I reserve the right to penalize your grade on in-class activities (since your group had to complete a portion of it without you).. You are expected to read the assigned material in your textbook prior to each lecture and to attempt any assigned problems. You should bring your book (in physical or electronic format), calculator, and solutions to assigned problems with you to class as we will sometimes refer to these during class time.

**Homework:** I will collect homework for grading approximately once each week. You will be told **at least** one class meeting in advance which problems you are expected to write up. You may need to complete problems in addition to those assigned in order to master course material. You are encouraged to discuss homework with your classmates (and with me) outside of class during my office hours. However, unless an assignment is specifically given as a group assignment, the final product that you submit should represent your own intellectual efforts. If you make significant use of other resources (print, online, classmates, friends, tutors, etc.), you should clearly cite this in your write-up. Some homework problems will require the use of a calculator or a computer. When using a calculator, make sure the method you used is clear. When using a computer, include a printout of the code and its output or the Maple worksheet that you used. In general, using a computer application for computations is preferred to using a calculator.

**Writing Assignments:** At various times throughout the course, I will assign short, informal writing assignments. Some of these you will complete during class time. Others you will complete outside of class time. We may revisit some of your previous writing later in the course, so you should keep all of your writing in one place.

**Quizzes:** I will occasionally give quizzes during class time. I will typically announce quizzes at least one day before I give them so you have some time to prepare. Quizzes are worth from 5-10 points, depending on their length and scope.

**Extra Credit:** There may be a few extra credit assignments during the semester (don't count on more than a handful). Some may be announced on the course website while others will be given in class. All extra credit will be offered to the entire class and must be handed in by the required due date. There will be no individual extra credit assignments.

**Programming and Computational Assignments:** Since the main emphasis of this course is learning to understand and apply numerical methods, there will be several programming and computational assignments during the semester (approximately two per chapter). Some will involve you writing a program to implement an algorithm and then using the algorithm on a given set of data (sometimes drawn from a real-world scenario). Others will involve using or modifying an existing algorithm or using a Maple worksheet to carry out computations.

**Exams:** This course will have four *in-class* exams and a *comprehensive final exam*, as outlined on the course schedule. Credit given on exam questions will be proportional to the amount of correct work shown. Some exams may have a "take-home" component. Little to no credit will be given if sufficient work is not shown, even when the final answer is correct. Your best three in-class exams will be worth 100 points each, while your lowest exam will be scaled to be out of 50 points. The final exam is worth 200 points.

**Presentations:** Each student will be expected to give an in-class presentation this semester on a mutually agreed upon topic (individually or as part of a group). Your presentation will contribute 50 points toward your final grade.

**Course Grading Policy:** Your final grade in the course will be computed using the following point structure and scale:

Homework/Quizzes/In-Class Activities:	150 points
Programming/Computational Assignments:	120 points
Writing Assignments:	30 points
Highest 3 Unit Exams:	300 points
Lowest Unit Exam:	50 points
Presentation:	50 points
<u>Final Exam:</u>	<u>200 points</u>
Total:	900 points

Final letter grades will be assigned based on the following scale:

97.0-100.0%	A+	82.0-86.9%	B	69.5-71.9%	C-
92.0-96.9%	A	79.5-81.9%	B-	67.0-69.9%	D+
89.5-91.9%	A-	77.0-79.4%	C+	60.0-66.9%	D
87.0-89.4%	B+	72.0-76.9%	C	<60.0%	F

**Make-up Work:** I will only give make-up assignments for *emergencies* or for absences which are officially sanctioned by the University. I will expect written documentation in either of these cases. If you miss an exam and a make-up exam is not warranted, you may replace your grade on **one** missed exam with your *un-scaled* percentage score on that portion of content on the final exam.

**Academic Honesty:** You are expected to do your own work. You may work with others and get help on assignments, but, unless the assignment is specifically designed as a group assignment, all work that you submit must be your own (or should be appropriately referenced). During exams and quizzes you will not be allowed to receive unauthorized help from others. Cheating and plagiarism are not tolerated in any course at any level. See the MSUM Academic Honesty policy for more information on the possible consequences of cheating.

**Learning Accommodations:** Minnesota State University Moorhead is committed to providing equitable access to learning opportunities for all students and strives to make courses inclusive and accessible in accordance with sections 504 and 508 of the 1973 Rehabilitation Act and the Americans with Disabilities Act. The University will make reasonable accommodations for students with documented disabilities. Accessibility Resources (AR) is the campus office that collaborates with students in need of special accommodations and assists in arranging reasonable accommodations.

If you have, or think you may have, a disability (e.g. mental health, attentional, learning, chronic health, sensory or physical):

- Please contact Accessibility Resources at (218) 477-4318 (V) or (800) 627.3529 (MRS/TTY) for more information, or stop by the AR office inside the Academic Support Center in Flora Frick Hall.
- If you are already registered with Accessibility Resources and have questions or concerns regarding your current Accommodation Letter, please contact Kari Klettke, Director, at: kari.klettke@mnstate.edu or 218-477-5859.
- Additional information is available on the AR website: <http://www.mnstate.edu/accessibility>

**Note:** If you are registered with the AR and have learning accommodations, please schedule an appointment to visit with me during my office hours to discuss implementation of your accommodation(s).

**Sexual Violence Policy:** Acts of sexual violence are intolerable. MSUM expects all members of the campus community to act in a manner that does not infringe on the rights of others. We are committed to eliminating all acts of sexual violence.

MSUM faculty and staff are concerned about the well-being and development of our students. We are obligated to share information with the MSUM Title IX Coordinator in certain situations to help ensure that the students' safety and welfare is being addressed, consistent with the requirements of the law. These disclosures include but are not limited to reports of sexual assault, relationship violence, and stalking.

If you have experienced or know someone who has experienced sexual violence, services and resources are available. You may also choose to file a report. For further information, contact Lynn Peterson, Title IX Coordinator, [petersnly@mnstate.edu](mailto:petersnly@mnstate.edu); 218-477-2967, or Ashley Atteberry, Director of Student Conduct & Resolution; [ashley.atteberry@mnstate.edu](mailto:ashley.atteberry@mnstate.edu), 218-477-2174; both located in Flora Frick 153. Additional information is available at: [www.mnstate.edu/titleix](http://www.mnstate.edu/titleix)

**Emergency Preparedness:** As we prepare to start a new academic year and semester, the MSUM Facilities, Grounds & Safety Committee would like everyone to review the Emergency maps as well as the Emergency Preparedness Guide. Even a quick look at this information can make a difference in how you may react/respond in an emergency situation. If you have questions after reviewing this information, please contact Jim Schumann, Director of Public Safety for further clarification. Thank you in advance for taking time to help protect yourself and others.

Building maps showing emergency exit routes, fire extinguisher locations, and fire alarm pull stations are conspicuously located in classrooms, labs, conference rooms, departmental main offices and residence halls. The Emergency Preparedness Guides (flip style booklets) are located with the maps.

Please review the floor plans as well as the guide so you know how to respond in an emergency situation to help protect yourself and others. If you have questions, please contact Ryan Nelson, Director of Public Safety, at [ryan.nelson@mnstate.edu](mailto:ryan.nelson@mnstate.edu) or 218.477.5869. or visit <https://www.mnstate.edu/publicsafety/>

**Thanks, And Let's Have a Great Semester!!**