



Math 266: Elementary Differential Equations

Self-Paced Enroll Anytime Online Course

This is an unofficial syllabus and is subject to change at any time. The official course syllabus is posted in Blackboard or available upon request.

Instructor & Course Information

Credits: 3 undergraduate credits

Prerequisites: Math 265: Calculus III, and proficiency in a programming language

Instructor: Mohammad Khavanin*

Email: Visit the Blackboard course for contact information.

*If you have any course questions prior to enrollment, please email und.online@und.edu

Textbook and Course Materials:

The textbook and student solutions manual are both required for this course.

Nagle, R. K., Saff, E. B., & Snider, A. D. (2018). Fundamentals of Differential Equations (9th Edition)
Pearson Publishing.

- ISBN:10-0321977068
- ISBN 13: 978-0-321-97706-9
- We will be covering chapters 1, 2, 4, 7, and 9.

*Student's Solutions Manual for Fundamentals of Differential Equations 8e and Fundamentals of
Differential Equations and Boundary Value Problems 6e 6th edition*

- ISBN-13: 9780321748348
- ISBN-10: 03217488344
- Victor Maymeskul

Course Description and Objectives

This course covers methods of finding solutions to the First Order and second order differential equations. Laplace transforms is introduced to solve initial value problems when a forcing function with jump discontinuity is involved. The theory of linear systems is discussed in normal form and present matrix methods for solving such systems.

Technical Requirements:

The [UND Technical Support webpage](#) contains information on your UND email and how to download a free version of Microsoft Office.

- Students are expected to use their official UND email in the course.
- Adobe Acrobat Reader is required for this course and can be downloaded free [from Adobe's website](#).
- [View the basic technical requirements](#) for every online course.

- Homework is submitted as a pdf file. You need a printer and scanner if you wish to complete the assignments on paper. You may also use a touchscreen laptop with a stylus to complete homework.
- The exams are proctored using ProctorU Live as the proctoring method. Visit the exam folders in Blackboard or the [Self-Paced Enroll Anytime Exams webpage](#) for more information on the exam process and technical requirements.

Course Overview & Organization:

This course consists of 4 units divided into a total of 24 lessons (four of them are exams); each lesson (except for the exams) contains the following structural elements:

- Lesson objectives and to-do list
- Required Reading
- Introductory lecture
- Assessment

Each lesson (except for the exams) covers the material that would be equivalent to two hours class material during a regular semester. Study your textbook and the examples carefully by working through each step presented.

Unit 1: Lesson 1 through Lesson 5 and Exam 1

- Lesson 1 - Solutions and Initial Value Problems
- Lesson 2 - Geometrical or Graphical Consideration (Isoclines)
- Lesson 3 - Separable Equations
- Lesson 4 - Linear First Order Differential Equations
- Lesson 5 - Exact Differential Equations
- Lesson 6 - Exam I

Unit 2: Lesson 7 through Lesson 12 and Exam 2

- Lesson 7 - Homogeneous Linear Equations
- Lesson 8 - Auxiliary Equations with Complex Roots
- Lesson 9 - Method of Undetermined Coefficients
- Lesson 10 - Superposition and Nonhomogeneous Equations
- Lesson 11 - Variation of Parameters
- Lesson 12 - Variable coefficient equations
- Lesson 13 - Exam II

Unit 3: Lesson 14 through Lesson 17 and Exam 3

- Lesson 14 - Laplace Transforms
- Lesson 15 - Properties of the Laplace Transforms
- Lesson 16 - Inverse Laplace Transform and Solving Initial Value Problems
- Lesson 17 - Transforms of Discontinuous and Periodic Functions and Convolutions
- Lesson 18 - Exam III

Unit 4: Lesson 19 through Lesson 23 and Exam 4

- Lesson 19 - Matrices and Vectors
- Lesson 20 - Linear Systems
- Lesson 21 - Homogeneous Linear System with Constant Coefficients
- Lesson 22 - Complex Eigenvalues
- Lesson 23 - Nonhomogeneous Linear Systems

- Lesson 24 - Exam IV

Each Lesson composed of four parts:

1. Instructional notes - Read over the notes presented in the content and pay close attention to the **examples**. You should expect to spend at least three hours reading the related material and studying the examples before attempting the homework problems.
2. Lectures
3. The homework problems consist of two parts.
 - I. The first part is the **practice problems** that cover the important topics in each lesson; these problems will help you to understand the material clearly. **Do not turn in the practice problems.** Be sure to do these before you attempt the Turn in Assignments.
 - II. Turn in Assignments —there are 20 Turn in Assignments. Each corresponds to a lesson. Be sure you have worked through the practice problems for the lessons before you attempt the online Turn in Assignments, each Assignment is worth 5 points. To get credit for a turn in problem be sure to show how the answer is obtained. Again, don't forget that even if your answer is completely correct, if I do not see all the steps on your paper I cannot give you any credit. Skipping the practice problems and working only on the turning problems almost certainly will not provide adequate practice with the material for you to do well on the exam. In fact, it may be that you will want to do even more than the practice problems if you feel unsure about understanding some of the lessons. Consider the practice problems as a **minimal** list of problems, you need to do to succeed.

Write your solution in a neat, logical fashion with easy to follow steps. There are 20 **turn in Assignments**. An overall sum of the 20 assignment will be computed and count as 1/5 of your grade.

And follow the process included in the "How to turn in your Assignments in the content area of the course."

4. **A unit exam**--four proctored exams. Each exam is worth 100 points. There are no retakes on exams, or extra credit. The exams are split into two parts:
 - The first part contains the exam **questions** and has multiple-choice answers.
 - The remaining points come from your supporting **written work**. This must be submitted within 10 minutes of completing the multiple-choice portion.

The exact point values for each section are listed in the Blackboard exam folder.

The exams are proctored using ProctorU Live+ as the proctoring method. Visit the exam folders in Blackboard or the [Self-Paced Enroll Anytime Exams webpage](#) for more information on the exam process and technical requirements.

While this is an online course, it is also a mathematics course. Math is a process—it is not always about getting the correct answer. That is why it is very important that you show all your work on exams. If I can see what you are doing, I can give you partial credit for your answers and correct any mistakes you may be making. When you take the exams, keep in mind that you will not be allowed to use a book, notes, or calculator. Be sure to show all your work for full credit on each problem.

Assessment and Grading:

Grading: This course consists of 4 units divided into a total of 24 lessons. Your grade will be based on two different components:

1. Turn-In Assignments—there are 20 Turn-In Assignments. Each corresponds to a lesson. Be sure you have worked through the Practice problems for the lesson before you attempt the Turn-In Assignments.

There are 24 total lessons (four of them are proctored exams); each lesson (except for the exams) covers the material that would be equivalent to two hours class material during a regular semester. Study your textbook and the examples carefully by working through each step presented. Read over the instructional notes presented here and pay close attention to the examples. You should expect to spend at least three hours reading the related material and studying the examples before attempting the homework problems. The homework assignments consist of two parts. Practice-Problems that cover the important topics in each lesson; these problems will help you to understand the material clearly. Do not turn in the Practice problems. In order to do well in this course, however, it is necessary that you try to do all the Practice problems.

Remember that the best way to master topics in mathematics is to study and do problems every day. The second part of the homework assignment is the Turn-In Assignments. This portion consists of a small number of problems. To get credit for a homework problem, be sure to show how the answer is obtained. Skipping the Practice Problems and working only on the Turn-In Assignments almost certainly will not provide adequate practice with the material for you to do well on the exam. In fact, it may be that you will want to do even more than the Practice problems if you feel unsure about understanding some of the lessons. Consider the Suggested Problems as a minimal list of problems you need to do to succeed.

Write your solution in a neat, logical fashion with easy to follow steps. Scan your turn-in problems and save the file in a pdf format. Then attached them using the link in the Lessons area. They will be graded, and you can view feedback in the gradebook (normally, a turn-around time of 5 days or so is typical). There will be 20 such written assignments. Assignments will be graded on a scale from 0 to 5. An overall sum of the 20 assignments will be computed and count as 1/5 of your grade (100 points).

2. Unit exams--four proctored exams. Each exam is worth 100 points.

Total points will be divided up as follows:

Turn-In Assignments: (20 Assignments; 5 points each)	100 points
<u>Unit Exams: (4 Unit Exams; 100 points per exam)</u>	<u>400 points</u>
Total	500 points

Using the 90/80/70/60 percent basis, grades will be assigned as follows:

A	450 – 500 points.
B	400 – 449 points
C	350 – 399 points
D	300 – 349 points
F	below 299 points

Netiquette

Netiquette is a set of rules for behaving properly online. [Here are a few basic points to remember](#) when communicating in this course.

Always use professional language (no netspeak) in your assignments and emails. Please be respectful of others at all times, even if you disagree with their ideas.

About UND Self-Paced Enroll Anytime Courses

You have 3 to 9 months to complete this course from the time of your enrollment. You may work at your own pace and complete lessons/exams on your own schedule, submitting up to 3 per week for grading.

After you finish your course, your final grade will be posted in Blackboard. Please **allow 3-5 business days for your final grade to appear** on your transcript in Campus Connection. You will receive a confirmation email from the Enroll Anytime staff once the final grade is officially posted on your transcript. You may then order an official transcript, if desired.

If you have an **administrative** question regarding course enrollment dates, extensions, withdrawals, questions regarding your transcript, or need exam assistance, please contact the **Office of Extended Learning** at und.courses@UND.edu or 701-777-0488.

Questions regarding **coursework** should be directed to the **instructor**.

For **technical support** including username and password help, assignment submission, or other technical assistance in the course, contact [University Information Technology](#).

Student Resources

Many services are available to online students such as writing assistance from the UND Writing Center, free online tutoring, and more. Visit the [Student Resources page](#) for more information. You can also access the resources webpage from the *Student Resources* link in your Blackboard course menu.

University of North Dakota Policies & Resources

Academic Integrity

Academic integrity is a serious matter, and any deviations from appropriate behavior will be dealt with strongly. At the discretion of the professor, situations of concern may be dealt with as a scholastic matter or a disciplinary matter.

As a scholastic matter, the professor has the discretion to determine appropriate penalties to the student's workload or grade, but the situation may be resolved without involving many individuals. An alternative is to treat the situation as a disciplinary matter, which can result in suspension from the University, or have lesser penalties. Be aware that I view this as a very serious matter, and will have little tolerance of or sympathy for questionable practices. A student who attempts to obtain credit for work that is not their own (whether that be on a paper, quiz, homework assignment, exam, etc.) will likely receive a failing grade for that item of work, and at the professor's discretion, may also receive a failing grade in the course. Read more in the [Code of Student Life](#).

Disability Support and Medical Services

The University of North Dakota is committed to providing equal access to students with documented disabilities. To ensure access to your classes and program, please contact [Disability Services for Students](#) (DSS) to engage in a confidential discussion about accommodations for the classroom, clinical and/or online course settings.

Accommodations are not provided retroactively. Students are encouraged to register with DSS at the start of their class/program. More information can be obtained by email UND.dss@UND.edu or by phone at 701.777.2664.

If you receive an exam accommodation from Disability Services for Students, share the letter with the Office of Extended Learning at UND.courses@UND.edu.

Religious Accommodations

UND offers religious accommodations, which are reasonable changes in the academic environment that enable a student to practice or observe a sincerely held religious belief without undue hardship on the University. Examples include time for prayer or the ability to attend religious events or observe a religious holiday. To request an accommodation, complete [student religious accommodation request form](#). If you have any questions, you may contact the [Equal Opportunity & Title IX Office](#).

Pregnancy Accommodations

Students who need assistance with academic adjustments related to pregnancy or childbirth may contact the Equal Opportunity & Title IX Office or Academic Affairs to learn about your options. Additional information and services may be found at [Pregnancy Resources](#).

Resolution of Problems

Should a problem occur, you should speak to your instructor first. If the problem continues to be unresolved, go to the department chair, and next to the college Dean. Should the problem persist, you have the right to go to the Provost next, and then to the President.

Notice of Nondiscrimination

It is the policy of the University of North Dakota that no person shall be discriminated against because of race, religion, age, color, gender, disability, national origin, creed, sexual orientation, gender identity, genetic information, marital status, veteran's status, or political belief or affiliation and the equal opportunity and access to facilities shall be available to all. Concerns regarding Title IX, Title VI, Title VII, ADA, and Section 504 may be addressed to Donna Smith, Assistant Vice President for Equal Opportunity & Title IX and Title IX/ADA Coordinator, by calling 701.777.4171 or emailing UND.EO.TitleIX@UND.edu. Concerns can also be directed to the Office for Civil Rights, U.S. Department of Education, 230 S. Dearborn St., 37th Floor, Chicago, IL 60604, or any other federal agency.

Reporting Discrimination, Harassment, or Sexual Misconduct

If you or a friend has experienced sexual misconduct, such as sexual harassment, sexual assault, domestic violence, dating violence, or stalking, please contact the [Equal Opportunity & Title IX Office](#) or UND's Title IX Coordinator, Donna Smith, for assistance: 701.777.4171; donna.smith@UND.edu. You may also contact the Equal Opportunity & Title IX office if you or a friend has experienced discrimination or harassment based on a protected class, such as race, color, national origin, religion, sex, age, disability, sexual orientation, gender identity, genetic information, pregnancy, marital or parental status, veteran's status, or political belief or affiliation.

Faculty Reporting Obligations Regarding Discrimination, Harassment, and Sexual Misconduct

It is important for students to understand that faculty are required to share with UND's Title IX Coordinator any incidents of sexual misconduct or of discrimination or harassment based on a protected class they become aware of, even if those incidents occurred in the past or are disclosed as part of a class assignment. This does not mean an investigation will occur if the student does not want that, but it does allow UND to provide resources to help the student continue to be successful at UND. If you have been impacted by discrimination, harassment, or sexual misconduct, you can find information about confidential support services at the [Equal Opportunity & Title IX Office](#).

UND Cares Program

The [UND Cares program](#) seeks to educate faculty, staff and students on how to recognize warning signs that indicate a student is in distress.

How to Seek Help When in Distress

We know that while college is a wonderful time for most students, some students may struggle. You may experience students in distress on campus, in your classroom, in your home, and within residence halls. Distressed students may initially seek assistance from faculty, staff members, their parents, and other students. In addition to the support we can provide to each other, there are also professional support services available to students on campus through the Dean of Students and University Counseling Center. Both staffs are available to consult with you about getting help or providing a friend with the help that he or she may need. Visit the [UND Cares program](#) webpage for more additional information.

How to Recognize When a Student is in Distress

The term “distressed” can mean any of the following:

- Student has significant changes in eating, sleeping, grooming, spending, or other daily activities.
- Student has cut off or minimized contact with family or friends.
- Student has significant changes in performance or involvement in academics, sports, extracurricular, or social activities.
- Student describes problems (missing class, not remembering, destructive behavior) that result from experiences with drinking or drugs.
- Student is acting withdrawn, volatile, tearful, etc.
- Student is acting out of character or differently than usual.
- Student is talking explicitly about hopelessness or suicide.
- Student has difficulty concentrating or difficulty carrying on normal conversation.
- Student has excessive dependence on others for company or support.
- Student reports feeling out of control of one’s emotions, thoughts, or behaviors.

Land Acknowledgement Statement

Today, the University of North Dakota rests on the ancestral lands of the Pembina and Red Lake Bands of Ojibwe and the Dakota Oyate - presently existing as composite parts of the Red Lake, Turtle Mountain, White Earth Bands, and the Dakota Tribes of Minnesota and North Dakota.

We acknowledge the people who resided here for generations and recognize that the spirit of the Ojibwe and Oyate people permeates this land. As a university community, we will continue to build upon our relations with the First Nations of the State of North Dakota - the Mandan, Hidatsa, and Arikara Nation, Sisseton-Wahpeton Oyate Nation, Spirit Lake Nation, Standing Rock Sioux Tribe, and Turtle Mountain Band of Chippewa Indians.