

MATH 2120 - Differential Equations
3 Credit Hours

Course Description:

An introduction to the basic concepts, theory, methods, and applications of ordinary differential equations, including systems of equations and transform methods.

Course Outcomes:

Upon successful completion of this course, students will:

1. Solve 1st order linear and nonlinear differential equations
2. Solve 2nd order linear differential equations
3. Solve higher order linear differential equations
4. Compute Laplace Transforms and use them to solve differential equations
5. Solve systems of linear differential equations
6. Use differential equations to model real world behaviors and apply mathematical concepts to solution of real-life problems.
7. Use technology for mathematical reasoning and problem solving

Prerequisites and Corequisites:

MATH 1910 and MATH 2010 with a minimum grade of "C." Corequisite: MATH 2010

Course Topics:

1. Module 1
 1. Chapter 1: Introduction to Differential Equations
 1. Section 1.1 Definitions and Classifications
 2. Section 1.2 Solutions to Differential Equations
 3. Section 1.3 Introduction to Initial Value Problems
 4. Section 1.4 Slope Fields
 2. Chapter 2: First Order Differential Equations
 1. Section 2.1 Separable Equations
 2. Section 2.2 Linear Equations: Method of Integrating Factors

3. Section 2.3 Introduction to Modeling
4. Section 2.4 Bernoulli Equations
5. Section 2.5 Exact Equations
2. Module 2
 1. Chapter 3: Second Order Differential Equations
 1. Section 3.1 Second Order Equations: Distinct Roots
 2. Section 3.2 Second Order Equations: Repeated Roots
 3. Section 3.3 Second Order Equations: Complex Roots
 4. Section 3.4 Method of Undetermined Coefficients
 5. Section 3.5 Modeling with Second Order Equations (optional)
 2. Chapter 4: Higher Order Differential Equations
 1. Section 4.1 Homogeneous Higher Order Linear Differential Equations with Constant Coefficients
 2. Section 4.2 Nonhomogeneous Higher Order Linear Differential Equations with Constant Coefficients
3. Module 3
 1. Chapter 5: The Laplace Transform
 1. Section 5.1 Computing Laplace Transforms
 2. Section 5.2 Properties of the Laplace Transform
 3. Section 5.3 Solving IVP's Using the Laplace Transform
 2. Chapter 6: Systems of Differential Equations
 1. Section 6.1 Introduction to Homogeneous Systems of Differential Equations
 2. Section 6.2 Systems of Differential Equations with Complex Eigenvalues
 3. Section 6.3 Systems of Differential Equations with Repeated Eigenvalues

Specific Course Requirements:

- You will need a calculator that can do matrix operations.
- The TI-84 or TI Nspire (without CAS) family is recommended.
- **A calculator with a computer algebra system (CAS) is prohibited on proctored exams.**
- **The TI-89 Titanium and the TI-Nspire CAS and TI-Nspire CX CAS are prohibited on proctored exams.**

Required Textbooks:

Please visit the [Virtual Bookstore](#) to obtain textbook information for this course. Move your cursor over the "Books" link in the navigation bar and select "Textbooks & Course Materials."

Select your Program, Term, Department, and Course; then select "Submit."

Supplementary Materials:

*Even though a textbook is not required, you may wish to buy one anyway as a more detailed reference. Here's is a list of three recommended textbooks:

- Elementary Differential Equations, Boyce and DiPrima, 10th ed., 2012 John Wiley and Sons
- Elementary Differential Equations, Kohler and Johnson, 2nd ed., 2006 Pearson Education
- A First Course in Differential Equations with Modeling Applications, Zill, 10 ed., 2013 Cengage

Hardware and Software Requirements:

Minimum hardware requirements can be found [here](#).

Minimum software requirements can be found [here](#).

Common applications you might need:

To read a PDF file download the latest version of [Adobe Reader here](#)

Don't have Microsoft Word? Explore an alternative [OpenOffice here](#)

Accessing a PowerPoint file? Download the [PowerPoint Viewer here](#)

Web Resources:

Purdue [OWL Online Writing Lab](#) (for APA, MLA, or Chicago style)

The Writing Center [Online Writer's Handbook](#)

Student Resources:

- Technical support information can be found on the [TN eCampus Help Desk](#) page.
- Smarthinking virtual tutoring is available **FREE** of charge. to access Smarthinking, visit the course homepage and select Smarthinking under Course Resources. You also view [sample sessions](#) to see what Smarthinking offers and how it works.
- Information on other student issues or concerns can be located on the [TN eCampus](#)

[Student Resources](#) page.

Instructor Information:

Please see "Instructor Information" in the Getting Started Module for instructor contact information, virtual office hours, and other communication information. You can expect to receive a response from the instructor within 24-48 hours unless notified of extenuating circumstances.

Testing Procedures:

- Quizzes will be unproctored. However, all work for quizzes must be submitted in the dropbox. Work may be typed using an equation editor, or handwritten, then scanned or digitally photographed. The work must be readable to receive credit.
- The Midterm and Final Exam will be proctored. Work for the Midterm and Final Exam must be submitted to the proctor.
- On the Midterm and Final Exam, you are allowed to use a TI-83, TI-84, or TI-84 plus graphing calculator. If you want to use a different calculator, you must have it preapproved by the instructor.
- A calculator with a computer algebra system (CAS) is prohibited on proctored exams.
- [TN eCampus Test Proctoring](#) (opens a new window)

Grading Procedures:

- Each module will have 4 dropbox homework assignments and 2 quizzes.
- The Midterm Exam will cover Module 1 and the first half of Module 2. The Final Exam will primarily cover the second half of Module 2 and all of Module 3. The Final Exam may also cover a few selected topics from the Midterm Exam.
- All work for quizzes and dropbox homework assignments must be submitted to the appropriate dropbox folder. The instructor will grade the assignments within one week of the due date. Work may be typed using an equation editor, or handwritten, then scanned or digitally photographed. The work must be readable to receive credit.
- All work for the Midterm and Final Exam must be submitted to the proctor and that work will be submitted to the instructor. The instructor will grade the exams within one week of receiving the work from the proctor.

Grading Scale:

900-1000 Points	A
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800-899 Points	B
700-799 Points	C
600-699 Points	D
under 600 Points	F

Assignments and Projects:

Dropbox homework assignments must be submitted through the appropriate dropbox. Work may be typed using an equation editor, or handwritten, then scanned or digitally photographed. The work must be readable to receive credit.

Description	Points
12 Dropbox Homework Assignments (Drop 2), 15 points each	150 points
6 Quizzes (drop 1) 30 points each (unproctored)	150 points
Midterm Exam 350 points (proctored)	350 points
Final Exam 350 points (proctored)	350 points
Total Points	1000 points

Class Participation:

- Class participation will be monitored but not graded.
- Participation includes: reading lessons and watching lecture videos, completing assignments on time, emailing questions, and participating in discussion on the discussion board.
- Your first day of attendance will be recorded as the first day you introduce yourself in the discussion board or complete an assignment.
- Your last day of attendance will be recorded as the last day you completed an assignment.

Late Policy:

- All dropbox homework assignments will have due dates and times. Any dropbox homework assignment not turned in by the due date and time will be penalized 50%. The two lowest dropbox assignments will be dropped at the end of the semester to account for missed or late assignments due to special circumstances or emergencies. You do not have to document your circumstances. The grades will be automatically dropped.
- All quizzes will have due dates and times. Any quiz completed after the due date and time will be penalized 50%. The one lowest quiz will be dropped at the end of the semester to account for missed or late quizzes due to special circumstances or emergencies. You do not have to document your circumstances. The grade will be automatically dropped.
- The Midterm Exam and the Final Exam will have due dates and times. If they are not taken by the due date, the student must provide the instructor with sufficient documentation (such as a doctor's note) for the missed exam and schedule a make-up exam within one week of the exam. Otherwise the student will receive a score of 0 for the exam. **The windows to take the Mid-term and Final Exams cannot be changed!**

Course Ground Rules:

The following two statements (1., 2.) were derived from the TBR System-wide Student Rules document, released January 2012:

RULES OF THE TENNESSEE BOARD OF REGENTS STATE UNIVERSITY AND
COMMUNITY COLLEGE SYSTEM OF TENNESSEE SYSTEMWIDE STUDENT RULES
CHAPTER 0240-02-03 STUDENT CONDUCT AND DISCIPLINARY SANCTIONS

[Read the document in its entirety here.](#)

1. Standards of Conduct:

- Students are required to adhere to the same professional, legal and ethical standards of conduct online as on campus. In addition, students should conform to generally accepted standards of "netiquette" while sending e-mail, posting comments to the discussion board, and while participating in other means of communicating online. Specifically, students should refrain from inappropriate and/or offensive language, comments and actions.

2. [Review the TN eCampus Academic Integrity/Academic Honesty Policy:](#)

- In their academic activities, students are expected to maintain high standards of honesty and integrity. Academic dishonesty is prohibited.

Such conduct includes, but is not limited to:

- an attempt by one or more students to use unauthorized information in the taking of an exam
- to submit as one's own work, themes, reports, drawings, laboratory notes, computer programs, or other products prepared by another person,
- or to knowingly assist another student in obtaining or using unauthorized materials.

Plagiarism, cheating, and other forms of academic dishonesty are prohibited.

Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are subject to disciplinary action through the regular procedures of the student's home institution. Refer to the student handbook provided by your home institution to review the student conduct policy.

In addition to other possible disciplinary sanctions that may be imposed, the instructor has the authority to assign an "F" or zero for an activity or to assign an "F" for the course.

Other Course Rules:

Students are expected to:

- Participate in all aspects of the course
- Communicate with other students
- Learn how to navigate in Brightspace
- Keep abreast of course announcements
- Use the assigned course management (Brightspace) email address rather than a personal email address
- Address technical problems immediately:
 - [Contact Technical Support](#)
 - [View Term Calendar here](#)
- Observe course netiquette at all times.

Guidelines for Communications:

Email:

- Always include a subject line.
- Remember without facial expressions some comments may be taken the wrong way. Be careful in wording your emails. Use of emoticons might be helpful in some cases.
- Use standard fonts.
- Do not send large attachments without permission.

- Special formatting such as centering, audio messages, tables, html, etc. should be avoided unless necessary to complete an assignment or other communication.
- Respect the privacy of other class members

Discussions:

- Review the discussion threads thoroughly before entering the discussion. Be a lurker then a discussant.
- Try to maintain threads by using the "Reply" button rather starting a new topic.
- Do not make insulting or inflammatory statements to other members of the discussion group. Be respectful of other's ideas.
- Be patient and read the comments of other group members thoroughly before entering your remarks.
- Be cooperative with group leaders in completing assigned tasks.
- Be positive and constructive in group discussions.
- Respond in a thoughtful and timely manner.

Library:

The [Tennessee Virtual Library](#) is available to all students enrolled in TN eCampus programs and courses. Links to library materials (such as electronic journals, databases, interlibrary loans, digital reserves, dictionaries, encyclopedias, maps, and librarian support) and Internet resources needed by learners to complete online assignments and as background reading will be included within the course modules. To access the Virtual Library, go to the course homepage and select the ***Virtual Library*** link under Course Resources.

Students with Disabilities:

Qualified students with disabilities will be provided reasonable and necessary academic accommodations if determined eligible by the appropriate disability services staff at their home institution. Prior to granting disability accommodations in this course, the instructor must receive written verification of a student's eligibility for specific accommodations from the disability services staff at the home institution. It is the student's responsibility to initiate contact with their home institution's disability services staff and to follow the established procedures for having the accommodation notice sent to the instructor.

Syllabus Changes:

The instructor reserves the right to make changes as necessary to this syllabus. If changes are necessitated during the term of the course, the instructor will immediately notify students of such changes both by individual email communication and posting both notification and nature of change(s) on the course bulletin board.

Disclaimer

The information contained in this syllabus is for general information purposes only. While we endeavor to keep this information up-to-date and accurate, there may be some discrepancies between this syllabus and the one found in your online course. The syllabus of record is the one found in your online course. Please make sure you read the syllabus in your course at the beginning of the semester. Questions regarding course content should be directed to your instructor.