



Differential Equations  
MTH 240-001  
Spring 2023  
Sugar Grove Campus, BDE 244  
TTh 8:00am-9:15am

### Instructor Contact Information and Availability

Name and Title:	Dr. Steve Kifowit, Assistant Professor of Mathematics (Pronouns: He/Him/His)
Waubonsee Email:	skifowit@waubonsee.edu
Office Location:	Sugar Grove Campus, BDE 249
Office Hours:	MTWTh 11:30am-12:30pm, MW 2:15pm-2:45pm, or by appointment
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Preferred Contact Method:	Email or in-person
Response Time:	During weekdays, please allow for up to 24 hours for email response.

### Course Description

This course is designed to introduce basic theory, techniques, and applications of differential equations. Several types of differential equations will be solved including linear equations of first and second order, exact equations, separable equations, non-linear equations, and partial differential equations. Methods of solution will include variation of parameters, undetermined coefficients, series solutions, numerical solutions, graphical solutions, and the Laplace transform.

### Prerequisite(s)

MTH 132 (Calculus II) with a C or better

### Illinois Articulation Initiative (IAI) Code

MTH 912

## Course Materials

### Textbook (required)

Edwards & Penny (2019). *Elementary Differential Equations with Boundary Value Problems* (6th ed.). Pearson, ISBN: 9780134995410

### Class Materials and Resources

The TI-83/84 Graphing Calculator is required for the course.

## Important Class Notes

Recommended Corequisite: None

Course Delivery Mode: Face-to-face

Credit Hours: 3.0

## Course Objectives

Throughout this course, the student will learn to:

1. solve first order and linear differential equations of any degree using the methods of separation of variables, homogeneous equations, exact equations, integrating factors, substitution, auxiliary equations, undetermined coefficients, variation of parameters, Laplace transforms, and power series;
2. apply the theory of differential equations to applications in chemistry, physics, and electricity;
3. solve initial value problems by Laplace transform methods;
4. solve partial differential equations by separation of variables;
5. apply partial differential equations to various problems in physics and mathematics.

## Student Learning Outcomes

### Course Learning Outcomes

Upon successful completion of this course, the student will be able to:

1. classify differential equations and determine appropriate methods of solution;
2. solve linear ordinary equations with constant coefficients; and
3. solve a damping problem via a second order ordinary differential equation.

### College Learning Outcomes

This course contributes to the following college learning outcomes:

#### Critical Thinking

Examine information in order to propose or develop solutions or construct arguments.

- Communication  
Use clear language to communicate meaning appropriate to various contexts and audiences.
- Quantitative Literacy  
Make judgments or draw appropriate conclusions based on the quantitative analysis of data.
- Global Awareness  
Describe the interconnectedness of issues, trends or systems using diverse perspectives.
- Information Literacy  
Use technology to ethically research, evaluate or create information.

## Methods of Evaluation of Student Learning, Grading Criteria, and Scale

Your performance in this course will be evaluated based on the following components:

### Grading Criteria

Total points: 500

Grading Components	Score	Quantity	Subtotal	Percent
Tests	100	3	300 points	60%
Quizzes	10	10	100 points	20%
Comprehensive Final Exam	100	1	100 points	20%

### Grading Scale

A ≥ 89.50%      B ≥ 79.50%      C ≥ 69.50%      D ≥ 59.50%      F < 59.50%

You can estimate your current grade at any time during the semester by computing the following percentage:  $100\% * (\text{Total points accumulated}) / (\text{Total points possible})$ . Please feel free to discuss your grade at any time during the semester. Throughout the semester, current grades will be available in our Canvas course shell.

### Attendance, late work, and make-up policy

Regular class attendance is an essential component of successful learning. Students are responsible for prompt attendance and participation in all class meetings. If you miss class, you will not be allowed to make up any tests, quizzes, or assignments that you may have missed (**but you may reschedule a test or quiz, or submit an assignment, in advance of a missed class period**). All material covered in class is the student's responsibility.

### Description and Details of Assignments

#### Homework and Reading Assignments

Suggested homework problems from the textbook will be assigned daily and posted to the class website. Most problems will not be collected for grading, but they should be considered

mandatory. It is important that you keep up to date with the homework exercises. Homework will prepare you for the tests and quizzes. Also on a daily basis, you will be asked to read and work through certain sections of the textbook.

## Quizzes

Be prepared for a 10-point, in-class quiz on each Thursday, unless a test is scheduled (see the course schedule). No make-up quizzes will be given (unless scheduled prior to the quiz). Quizzes may have take-home portions. At the end of the semester, only your top ten (10) quizzes will count toward your overall grade. Quiz problems will be similar to class examples and textbook problems.

## Tests

Test problems will be similar to class examples, textbook problems, and quiz problems. In addition to computational problems, tests may include multiple choice, true/false, short answer, and/or writing problems. You must show all work (showing how you got your answer) on all tests to receive full credit. **You must work individually on all tests.** No make-up tests will be given (unless scheduled prior to the test). At the end of the semester, your lowest test score will be replaced by your final exam score (if this helps you).

## Final Exam

The final exam is comprehensive and will be worth 100 points (20%) toward your final grade. The final exam is scheduled for our last class period, Thursday, May 11.

## Calculators

The TI-83/84 graphing calculator is required for this course. There are graphing calculator emulators available for smart phones and tablets--you may use these during class periods, but not during tests. If you would like to use a graphing calculator other than the TI-83/84, please discuss your options with your instructor. When we require more computational power than our hand-held calculators offer, we will use SageMath (<https://www.sagemath.org/>).

## Phones/Tablets/Laptops

Electronic devices may be used for taking notes and computing during lectures, but they may not be used on in-class tests. These devices must be silenced and put away during tests. Students in special circumstances who require their phones to be readily available must discuss their situations with the instructor.

## Institutional Policy

### Withdrawal

Waubonsee Community College reserves the right to administratively withdraw students who are not actively attending.

Students may withdraw themselves from this course until the date noted on the Tuition Refunds page.

\*\*\* Please see the [Student Handbook](#) for other course policies and procedures.

## Institutional Statements

### Academic Integrity

Waubonsee Community College believes that all members of the community (students, faculty, staff, and administrators) have a responsibility to participate in learning with honesty, respect, and integrity. We must commit to engage in learning both in and out of the classroom, value each member in our learning community, demonstrate original thought, and help foster ethical, open, safe learning environments for all. For more information, please see the Waubonsee Community College Plagiarism Statement section in the [Student Handbook](#).

### Accessibility and Disability Statement

Accessibility is a value of our institution. We are committed to creating environments that are welcoming and that support all students' learning. If you experience barriers to your learning in this course please notify the instructor as soon as possible to discuss options. Students who experience barriers due to disability may contact the Access Center for Disability Resources to begin this conversation or establish accommodations.

### Plagiarism

Waubonsee firmly upholds sound principles of academic integrity and responsibility. Plagiarism and cheating are serious infractions of academic integrity, and, as such, are considered breaches of the Code of Student Conduct. If a student has violated this policy, I will report the infraction to the Dean for Student Success and Retention and the student may fail the assignment or the course, depending on the severity or the number of infractions.

## Student Support Services and Resources

Waubonsee Community College is committed to your success, and has many free supports, services, and resources available to you. Please visit the [Waubonsee Cares](#) page for links to basic needs (food, shelter, safety, etc.) support and resources both on campus and in the community. Please see the [Student Experience](#) page for more information and to get connected with Academic Support, Career Development, Counseling and Advising, Disability Resources, Student Life, Student Services, Technical Assistance Center, the Veterans Program, and many more! If you're not sure what type of assistance you need, please talk to me and I will help get you connected.

## Course Schedule

<b>Week (Date)</b>	<b>Sections</b>	<b>Topics &amp; Assignments</b>
<b>Week 1</b> Jan 17 & Jan 19	Course Information, Sections 1.1 & 1.2	Intro to differential eqn's, Existence & uniqueness (Quiz on 1/19)
<b>Week 2</b> Jan 24 & Jan 26	Sections 1.3, 1.4, & 1.5	Slope fields, Euler's method, Separable eqn's, 1st-order linear eqn's (Quiz on 1/26)
<b>Week 3</b> Jan 31 & Feb 2	Sections 1.5 & 1.6	1st-order linear eqn's, Exact eqn's, Substitution (Quiz on 2/2)
<b>Week 4</b> Feb 7 & Feb 9	Sections 1.7 & 1.8, <b>Test 1 on Thursday, Feb 9</b>	Applications, Test 1 covers sections 1.1-1.8.
<b>Week 5</b> Feb 14 & Feb 16	Sections 2.1 & 2.2	Theory of general linear eqn's: existence & uniqueness, linear independence, Wronskian, superposition, etc. (Quiz on 2/16)
<b>Week 6</b> Feb 21 & Feb 23	Sections 2.3 & 2.4	Homogeneous, constant coefficient, linear eqn's and applications (Quiz on 2/23)
<b>Week 7</b> Feb 28 & Mar 2	Section 2.5	Nonhomogeneous eqn's, Undetermined coeffs, Variation of parameters (Quiz on 3/2)
<b>Week 8</b> Mar 7 & Mar 9	Section 2.6 & 2.7, <b>Test 2 on Thursday, Mar 9</b>	Applications, Test 2 covers sections 2.1-2.7.
<b>Spring Break</b> Mar 14 & Mar 16	<b>Spring Break</b>	No classes
<b>Week 9</b> Mar 21 & Mar 23	Sections 3.1 & 3.2	Series solutions near ordinary points (Quiz on 3/23)
<b>Week 10</b> Mar 28 & Mar 30	Sections 3.3 & 4.1	Regular singular points, Intro to Laplace transforms (Quiz on 3/30)
<b>Week 11</b> Apr 4 & Apr 6	Sections 4.1, 4.2, & 4.3	Intro to Laplace transforms, Translation. (Quiz on 4/6)
<b>Week 12</b> Apr 11 & Apr 13	Section 4.4, <b>Test 3 on Thursday, Apr 13</b>	Test 3 covers sections 3.1-3.3 & 4.1-4.3.
<b>Week 13</b> Apr 18 & Apr 20	Sections 4.4, 4.5, & 4.6	Properties of Laplace transforms, Piecewise cont. and step functions (Quiz on 4/20)
<b>Week 14</b> Apr 25 & Apr 27	Sections 8.1, 8.2, & 8.3	Fourier series (Quiz on 4/27)
<b>Week 15</b> May 2 & May 4	Sections 8.5 & 8.6	Separation of variables, Heat and wave equations (Quiz on 5/4)
<b>Week 16</b> May 9 & May 11	Review, <b>Final Exam on Thursday, May 11</b>	Final exam is comprehensive with emphasis on course learning outcomes.

April 14 is the last day for students to withdraw themselves. Please check the current [Waubonsee Academic Calendar](#) for important dates.

## Class Website

Course information, including tests, quizzes, answer keys, and homework problems, can be found on the class website at <http://stevekifowit.com/classes/m240.htm>.



Grades, announcements, and Zoom meeting information will be posted in our Canvas course shell. Other course information will be available on the class website.

## Change of Delivery Mode

In the event that we must discontinue our face-to-face class meetings, we will automatically transition to synchronous Zoom meetings at our scheduled days and times. Office hours will probably transition to Zoom as well---check for announcements to be sure.