



Course Description

A first course in differential equations. Topics include: linear equations of the first order, linear equations with constant coefficients, the general linear equations, variation of parameters, undetermined coefficients, linear independence, the Wronskian, exact equations, separation of variables, applications, systems of linear differential equations, the method and theory of Laplace transforms, existence and uniqueness of solutions, solution by power series, and partial differential equations.

Illinois Articulation Initiative (IAI) number: MTH 912

Credit and Contact Hours:

Lecture	3
Lab	0
Credit Hours	3

Prerequisites: Minimum grade “C” in MATH 172 or equivalent.

Books, Supplies, and Supplementary Materials

A. **Required Textbooks**

Cengage Unlimited Subscription. WebAssign will be used for online coursework (homework, quizzes, tests, etc.) and can be accessed by logging into iCampus/Canvas and selecting this course. If you are comfortable reading the textbook on the computer, you may use the eText alone. **There is no need to purchase a physical textbook for this course; the Cengage Unlimited Subscription for the eText and WebAssign was included in your course fees. Registration instructions are posted in our iCampus/Canvas site.**

B. **Other Required Materials**

Graphing calculator required.

C. **Methods of Instruction:**

Lecture, Hybrid, or Online

General Education Student Learning Outcome

1. Quantitative Literacy: Students possess the ability to reason and solve quantitative problems from an array of contexts.

Course Learning Outcomes (CLOs)

1. Analyze methods of solution for first-order differential equations.
2. Analyze methods of solution for higher-order differential equations.
3. Analyze differential equations using Laplace transformations.

4. Analyze differential equations using infinite series.
5. Analyze basic partial differential equations.

Lesson Learning Outcomes (LLOs)

1. Explain what is meant by a differential equation.
2. Explain the various terms such as "ordinary," "partial," "order," "linear," "nonlinear," etc. which apply to differential equations.
3. Explain what is meant by a solution of a differential equation.
4. Find a differential equation that will correspond to a given relation or set of conditions.
5. Explain what is meant by a general solution and a particular solution of a differential equation.
6. Explain the conditions under which the solution of a first-order ordinary differential equation exists and is unique.
7. Test a differential equation for exactness.
8. Solve exact differential equations.
9. Solve first order and simple higher order differential equations by application of the following methods: a. separation of variable b. transformation of variable c. techniques for homogeneous equation d. integrating factors involving one variable e. integration f. techniques for equations having one variable missing
10. Apply first-order and simple higher order differential equations to problems in topic areas selected by instructor such as mechanics, electric circuits, orthogonal trajectories, etc.
11. Write differential equations in operator notation.
12. Explain what is meant by the complementary equation.
13. Explain the conditions under which the solution of an nth order linear differential equation exist and are unique.
14. Obtain complementary solutions from the auxiliary equations: a. with non-multiple roots b. with repeated roots c. with imaginary roots
15. Obtain particular solution from the differential equation: a. by undetermined coefficients b. by exception to undetermined coefficients c. by variation of parameters d. by operator methods
16. Apply linear differential equations to problems in topic areas selected by instructor such as vibratory motion, electric circuits, etc.
17. Solve differential equations simultaneously: a. by substitution b. by elimination of variable c. by using operator notation
18. Apply simultaneous differential equations to problems in topic areas selected by instructor.
19. Solve linear differential equations by LaPlace transformations.
20. Solve differential equations by use of series using methods indicated by instructor such as the Taylor Series Method, Picard's Method of Iteration and the Method of Frobenius.
21. Find partial differential equations from given relations or physical problems (boundary value).
22. Solve by partial differential equation problems (boundary value) as indicated by instructor: a. by substitution b. by change of variable c. by Fourier series

Final Course Grading Scale

Grade	Percentage
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	lower than 60%

Faculty Commitment

Faculty members are committed to providing a quality learning experience through thoughtful planning, implementation, and assessment of course activities. They are also committed to being readily available to students throughout the semester by returning e-mails and phone calls within 48 hours and to returning graded course work within a week. Furthermore, they are committed to selecting appropriate course materials and making them available in an organized and timely manner.

Student Commitment

For every credit hour a student is enrolled in, they should expect to spend at least 2 hours outside of class studying, working on assignments, and preparing for class each week of the fifteen-week semester. For example, for this three credit-hour class, students can expect to spend three hours per week in class actively engaged in learning the material by participating in face-to-face classes or viewing lectures and instructional material online. In addition, students should expect to spend another six hours per week outside of class completing homework and assignments, posting to discussion boards online, or studying for quizzes and tests. This means students should spend a minimum of 9 hours per week engaged in achieving the learning outcomes for this course. If you are not achieving your desired results in this class, you should consider increasing your prep time outside of class, in addition to using available resources such as instructor office hours and tutoring services.

By registering for this course, you commit yourself to active participation in course activities as well as the submission of all assignments and exams on time. Furthermore, you commit to accessing the course site and checking your JJC e-mail several times a week.