Instructor's Name: 

Office Location: 

Office Hours: 

Office Phone: 

E-mail: 

Course Description
This is 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: Grade of “C” in Math 172 or equivalent

Books, Supplies, and Supplementary Materials

A. Textbooks


B. Other Required Materials

None

Methods of Instruction:
Lecture
Student Learning Outcomes: General Education Student Learning Outcomes:
Students will demonstrate the ability to accurately apply correct mathematical methods and techniques in various applications such as applied sciences, theoretical mathematics, physics, natural sciences and other applied sciences.

Objectives

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 \( n \)th 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
23. Apply partial differential equations in situations such as heat conduction and vibratory motion

TOPICAL OUTLINE

<table>
<thead>
<tr>
<th>Days</th>
<th>Topic or Class Activity</th>
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<tbody>
<tr>
<td>13</td>
<td>Differential equations, first order, and simple higher order equations and their applications</td>
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<tr>
<td>10</td>
<td>Linear differential equations and their applications</td>
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<tr>
<td>9</td>
<td>Laplace transforms and series solutions, systems of differential equations</td>
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<td>8</td>
<td>Partial differential equations and Fourier Series</td>
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<td>5</td>
<td>Leeway and Exams</td>
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Graded Assignments and Policies

Graded Assignments
In class Quizzes 0 – 20%
Participation 0 - 5%
Projects 0 – 20%
Homework 0 – 30%
Tests 50 - 85%
Final 15 – 30%

Grading Policy
The individual instructor will determine which items he or she considers essential for the student to memorize without error and test accordingly.
Each instructor will set minimum standards for performance on tests.

**Major Tests and Quizzes**
The individual instructor will determine which items he or she considers essential for the student to memorize without error and test accordingly. Each instructor will set minimum standards for performance on tests. A comprehensive final examination will be given.

**Classroom Policies and Procedures**

**General Information**

**Attendance Policy**

**Make-up Policy**

**Extra-credit Policy**

**Final Exam Information**
A comprehensive final examination will be given.

**Academic Honor Code**
The objective of the academic honor code is to sustain a learning-centered environment in which all students are expected to demonstrate integrity, honor, and responsibility, and recognize the importance of being accountable for one’s academic behavior.

**College Statement about grades of “F” and Withdrawal from Class**
Students may withdraw from a course by processing an add/drop form during regular office hours through the Registration and Records Office at Main Campus or Romeoville Campus, or by phone at 815-744-2200. Please note the withdrawal dates listed on your bill or student schedule. Every course has its own withdrawal date. Failure to withdraw properly may result in a failing grade of “F” in the course.

At any time prior to the deadline dates established, an instructor may withdraw a student from class because of poor attendance, poor academic performance or inappropriate academic behavior, such as, but not limited to, cheating or plagiarism.

**Intellectual Property**
Students own and hold the copyright to the original work they produce in class. It is a widely accepted practice to use student work as part of the college’s internal self-evaluation, assessment procedures, or other efforts to improve teaching and learning and in promoting programs and recruiting new students. If you do not wish your work to be used in this manner, please inform the instructor.

**Student Code of Conduct**
Each student is responsible for reading and adhering to the Student Code of Conduct as
stated in the college catalog.

**Sexual Harassment** Joliet Junior College seeks to foster a community environment in which all members respect and trust each other. In a community in which persons respect and trust each other, there is no place for sexual harassment. JJC has a strong policy prohibiting the sexual harassment of one member of the college community by another. See the Catalog or Student Handbook.

**Student Support** [http://jjc.edu/services-for-students/pages/default.aspx](http://jjc.edu/services-for-students/pages/default.aspx)

a. Disability Services: [http://www.jjc.edu/disability-services/Pages/default.aspx](http://www.jjc.edu/disability-services/Pages/default.aspx). Student Accommodations and Resources (StAR): If you need disability-related accommodations, specialized tutoring, or assistive technology in this class, if you have emergency medical information you wish to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class. New students should request accommodations and support by scheduling an appointment with the Student Accommodations and Resources (StAR) Office, Campus Center 1125, (815) 280-2230.

b. Tutoring: [http://jjc.edu/tlc/Pages/default.aspx](http://jjc.edu/tlc/Pages/default.aspx)

c. Counseling and Advising: [http://www.jjc.edu/counselingadvising/Pages/default.aspx](http://www.jjc.edu/counselingadvising/Pages/default.aspx)

d. Academic Resources: [http://www.jjc.edu/academic-resources/Pages/default.aspx](http://www.jjc.edu/academic-resources/Pages/default.aspx)

e. Support Programs and Services: [http://www.jjc.edu/support-programs-services/Pages/default.aspx](http://www.jjc.edu/support-programs-services/Pages/default.aspx)

f. Technology Support: [http://jjc.edu/services-for-students/Pages/technology-support.aspx](http://jjc.edu/services-for-students/Pages/technology-support.aspx)

g. My Degree Progress: My Degree Progress is a computerized system to track a student’s progress toward graduation. The report indicates every course and places these courses into their appropriate category as a General Education, Major Course, or Elective, according to the degree requirements. This tool is useful for preparing before an advising appointment, for planning, for registering, and for checking that the student is on track for graduation. [https://eresources.jjc.edu](https://eresources.jjc.edu)

* Instructor reserves the right to modify, add to or change the syllabus. Any changes to the syllabus or schedule will be announced in class.*