ORIGINAL COURSE IMPLEMENTATION DATE:	September 1999
REVISED COURSE IMPLEMENTATION DATE:	September 2026
COURSE TO BE REVIEWED (six years after UEC approval)**:**	December 2031

Course outline form version: 29/08/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: MATH 255

Number of Credits: 3 Course credit policy (105)

Course Full Title: Ordinary Differential Equations
Course Short Title: Ordinary Differential Equation

Faculty: Faculty of Science

Department/School: Mathematics and Statistics

Calendar Description:

This course provides theory and techniques needed to solve ordinary differential equations, with an emphasis on applications. Topics include first- and second-order linear differential equations, nonlinear equations, series solutions, Laplace transform methods, and linear systems of differential equations.

Note: This course is offered as MATH 255 and ENGR 255. Students may only take one of these for credit.

Prerequisites (or NONE):	MATH 112 or B or better in MATH 118.
Corequisites (if applicable, or NONE):	None.
Pre/corequisites (if applicable, or NONE):	One of MATH 152/ENGR 152, MATH 221, or PHYS 221.

Antirequisite Courses *(Cannot be taken for additional credit.)*

Former course code/number:

Cross-listed with: **ENGR 255**

Equivalent course(s):

(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar	50
Supervised laboratory hours (computer lab)	0
Total hours	**50**

Scheduled Laboratory Hours

Labs to be scheduled independent of lecture hours: **No**

Course Details

Special Topics course: **No**
(If yes, the course will be offered under different letter designations representing different topics.)

Directed Study course: **No**
(See policy 207 for more information.)

Grading System: **Letter grades**

Delivery Mode: **Face-to-face only**

Expected frequency: **Annually**

Maximum enrolment (for information only)**: 36**

Prior Learning Assessment and Recognition (PLAR)

PLAR is available for this course.

Yes

Transfer Credit *(See* ***bctransferguide.ca****.)*

Transfer credit already exists: **Yes**

Submit outline for (re)articulation: **Yes**
(If yes, fill in transfer credit form.)

Department approval	**Date of meeting:**	September 22, 2025
Faculty Council approval	**Date of meeting:**	October 31, 2025
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	December 19, 2025

Learning Outcomes *(These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)*

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

1. Solve first-order differential equations by recognizing the equations as either linear, separable and/or exact.
2. Apply the Existence and Uniqueness Theorem.
3. Solve second-order homogeneous linear equations with constant coefficients and associated initial value problems.
4. Test solutions of second-order linear equations for linear independence using the Wronskian.
5. Solve second-order nonhomogeneous equations by the method of undetermined coefficients and variation of parameters.
6. Interpret vibrational models.
7. Find series solutions of second-order linear equations near an ordinary point and a regular singular point.
8. Use the method of Laplace transforms to solve differential equations involving step functions and impulse functions.
9. Solve homogeneous linear systems with constant coefficients.
10. Interpret solutions to linear systems of equations as trajectories in phase space.
11. Formulate mathematical models and use technology to solve them.

Recommended Evaluation Methods and Weighting *(Evaluation should align to learning outcomes.)*

Final exam:	40%	Assignments:	15%		%
Quizzes/tests/midterm:	45%		%		%

Details: Students must achieve at least 40% on the final exam to receive credit for this course.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.)*

Lectures and demonstrations of software for graphing and/or symbolic computations.

Texts and Resource Materials *(Include online resources and Indigenous knowledge sources. Open Educational Resources (OER) should be included whenever possible. If more space is required, use the Supplemental Texts and Resource Materials form.)*

	Type	Author or description	Title and publication/access details	Year
1.	Book	Boyce and Di Prima	Elementary Differential Equations, 11 ed.	2017
2.	Book	Zill	A First Course in Differential Equations with Modeling Applications, 12 ed.	2023
3.				
4.				
5.				

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

Course Content and Topics

Use of graphing software is expected.

1. Direction fields, mathematical models.
2. First-order linear and non-linear differential equations, separable equations, autonomous equations, population dynamics, exact equations, integrating factors.
3. The Existence and Uniqueness Theorem (without proof).
4. Second-order homogenous linear equations with constant coefficients, linear independence, Wronskian, characteristic equation.
5. Nonhomogeneous equations, method of undetermined coefficients, variation of parameters, vibrational models.
6. Series solutions near an ordinary point and a regular single point, Euler equations.
7. Laplace transform, step functions, discontinuous forcing functions, impulse functions.
8. Systems of first-order homogeneous linear equations with constant coefficients, eigenvalues, phase plane analysis.