



Differential Equations – MATH 203

University Studies Program

Course Outline

COURSE IMPLEMENTATION DATE: Pre 1998
OUTLINE EFFECTIVE DATE: January 2021
COURSE OUTLINE REVIEW DATE: September 2026

GENERAL COURSE DESCRIPTION:

Differential equations are used to model change throughout the sciences. Course topics include: techniques for solving first order differential equations (separable equations, exact equations, integrating factors), with applications (population dynamics, mechanics); homogeneous and general second order linear equations; the Wronskian; higher order linear equations; power series solutions; the Laplace transform. General theory such as existence and uniqueness theorems will be discussed as appropriate.

Program Information: This course can be used to satisfy the requirements of an Associate of Science degree at College of the Rockies. This course is intended for students who are pursuing a Bachelor of Science degree.

Delivery: This course is delivered face to face.

COTR Credits: 3

Hours for this course: 60 hours

Typical Structure of Instructional Hours:

Instructional Activity	Duration
Lecture Hours	45
Seminars / Tutorials	
Laboratory / Studio Hours	15
Practicum / Field Experience Hours	
Other Contact Hours	
Total	60

Practicum Hours (if applicable):

Type of Practicum	Duration
On-the-job Experience	N/A
Formal Work Experience	N/A
Other	N/A
Total	

Course Outline Author or Contact:

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Signature

APPROVAL SIGNATURES:

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Department Head Signature

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EDCO

Valid from: January 2021 – September 2026

Education Council Approval Date

COURSE PREREQUISITES AND TRANSFER CREDIT

Prerequisites: MATH 201 or 205 (may be taken previously or concurrently)

Corequisites: None

Flexible Assessment (FA):

Credit can be awarded for this course through FA Yes No

Learners may request formal recognition for flexible assessment at the College of the Rockies through one or more of the following processes: External Evaluation, Worksite Assessment, Demonstration, Standardized Test, Self-assessment, Interview, Products/Portfolio, Challenge Exam. Contact an Education Advisor for more information.

Transfer Credit: For transfer information within British Columbia, Alberta and other institutions, please visit <http://www.cotr.bc.ca/Transfer>

Students should also contact an academic advisor at the institution where they want transfer credit.

Prior Course Number: N/A

Textbooks and Required Resources:

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

Boyce, William E. and DiPrima, Richard C. *Elementary Differential Equations and Boundary Value Problems* (11th edition). John Wiley & Sons, Inc., 2017

Please see the instructor's syllabus or check COTR's online text calculator

<http://go.cotr.bc.ca/tuition/tCalc.asp> for a complete list of the currently required textbooks.

LEARNING OUTCOMES:

Because differential equations are used in any field which attempts to model change, this course is appropriate for many careers, including Biology, Chemistry, Commerce, Computer Science, Engineering, Geology, Mathematics, Medicine, and Physics.

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

- Solve any first order linear differential equation using separation of variables, exact equations, or integrating factors;
- Use first order differential equations to model applied problems including population dynamics and mechanics;
- Solve any second order homogeneous linear differential equation with constant coefficients using the characteristic equation with distinct real roots, repeated real roots, or complex conjugate roots;
- Solve any second order nonhomogeneous linear differential equation with constant coefficients using the methods of undetermined coefficients or variation of parameters;
- Use second order linear differential equations with constant coefficients to model a variety of applied physical situations including projectile motion with linear damping, mechanical and electrical vibrations, and forced vibrations;
- Solve any higher order homogeneous linear differential equation with constant coefficients;
- Solve any higher order nonhomogeneous linear differential equation with constant coefficients using the methods of undetermined coefficients, annihilators, or variation of parameters;
- Understand the existence and uniqueness theorems for differential equations;
- Use power series to find solutions to higher order linear differential equation with nonconstant coefficients at any ordinary point;
- Use power series to find solutions to higher order linear differential equation with nonconstant coefficients at any regular singular point; and
- Use Laplace transforms to solve initial value problems.

This course should help you:

- Use written and oral communication skills effectively, employing methods appropriate to message and context;
- Think clearly and critically, fusing experience, knowledge and reasoning into considered judgment;
- Identify, interpret, and solve problems, effectively implementing and evaluating proposed strategies;

- Organizational, problem solving, and critical thinking skills;
- An ability to work both independently and in groups;
- An ability to transfer knowledge to new contexts;
- Practice comprehending and interpreting abstract materials from text; and
- An appreciation of the importance of persistence, attitude and energy.

COURSE TOPICS:

- First order linear, separable and homogeneous equations and their applications
- Analytic methods for solving first order differential equations
- Second order homogeneous and nonhomogeneous linear differential equations and their applications
- Analytic methods for solving second order differential equations
- Using series methods for solving and analyzing differential equations
- Laplace Transformations

See instructor’s syllabus for the detailed outline of weekly readings, activities and assignments.

EVALUATION AND ASSESSMENT (Face to Face Delivery):

Assignments	% Of total Grade
Final exam	40%
Midterm Test(s)	30%
Assignments	20%
Lab	<u>10%</u>
Total	100%

Please see the instructor syllabus for specific classroom policies related to this course, such as details of evaluation, penalties for late assignments, and use of electronic aids.

EXAM POLICY:

Students must attend all required scheduled exams that make up a final grade at the appointed time and place.

Individual instructors may accommodate for illness or personal crisis. Additional accommodation will not be made unless a written request is sent to and approved by the appropriate Department Head prior to the scheduled exam.

Any student who misses a scheduled exam without approval will be given a grade of “0” for the exam.

COURSE GRADE:

Course grades are assigned as follows:

Grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F
Mark (Percent)	≥ 90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	< 50

A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses.

ACADEMIC POLICIES:

See www.cotr.bc.ca/policies for general college policies related to course activities, including grade appeals, cheating and plagiarism.

COURSE CHANGES:

Information contained in course outlines is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational, employment, and marketing needs. The instructor will endeavour to provide notice of changes to students as soon as possible. The instructor reserves the right to add or delete material from courses.