



MATH-203 – Differential Equations

University Arts and Science

Effective Term & Year: Fall 2022
Course Outline Review Date: 2026-09-01

Program Area: Math and Sciences

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 Methods: On-campus (Face-to-Face)

Credit Type: College of the Rockies Credits

Credits: 3

Course type/s: Sciences

Instructional Activity and Hours:

Activity	Hours
Classroom, Directed Studies or Online Instruction	45
Seminar/Tutorials	

Laboratory/Studio	15
Practicum/Field Experience	
Co-op/Work Experience	
Other	
Total	60

Course Requisites:

- Completed or concurrently enrolled in at least 1 of the following:
 - MATH201 – Multivariable Calculus (3)
 - MATH205 – Multivariable & Vector Calculus (3)

Flexible Assessment: Yes

In some cases students may be able to apply for recognition of prior learning outside the classroom. This flexible assessment process provides equivalent course credit. It is a rigorous process that may include external evaluation, worksite assessment, demonstration, standardized test, self-assessment, interview, products/portfolio, and challenge exam, or other measures as appropriate. Tuition fees apply. Contact an education advisor for more information.

Course Transfer Credit:

For information about receiving transfer credit for courses taken at either British Columbia or Alberta institutions, please see <https://www.bctransferguide.ca/> or <https://transferalberta.alberta.ca> . For more transfer credit information, please visit <https://www.cotr.bc.ca/Transfer>

All requests for course transfer credit from institutions in British Columbia or elsewhere should go to the College of the Rockies Enrolment Services office.

Textbook 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 <https://textbook.cotr.bc.ca/> for a complete list of the currently required textbooks.

Learning Outcomes:

Upon the successful completion of this course, students 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 Assessments**Assessment Type: On-Campus (face-to-face)**

Assessment Type	% of Total Grade
Final exam	40%
Midterm Test(s)	30%
Assignments	20%
Lab	10%
Total	100%

Grade Scheme

A+	A	A-	B+	B	B-	C+	C	C-	D	F
>=90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	<50

Pass requirements: None

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

Exam Attendance:

Students must attend all scheduled exams at the appointed time and place. Instructors may approve an alternate exam to accommodate an illness or personal crisis. Department heads will consider other written requests. Any student who misses a scheduled exam without prior approval will receive a "0" on the exam.

Academic Policies:

College of the Rockies policies related to courses can be found at

<https://cotr.bc.ca/about-us/college-policies/> and include the following:

- Policy 2.4.3 Students with Documented Disabilities
 - Policy 2.4.4 Student Conduct (plagiarism, other cheating, behavioral misconduct)
 - Policy 2.5.8 Academic Performance
 - Policy 2.5.3 Grade Appeal
 - Policy 2.4.9 Student Concerns Re Faculty
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Course Changes:

The College of the Rockies updates course outlines regularly to meet changing educational, employment and marketing needs. The instructor will notify students in writing of any updates to this outline during the semester. The instructor reserves the right to revise, add or delete material while meeting the learning outcomes of this course outline.