



## MATH-202 – Vector Calculus

University Arts and Science

**Effective Term & Year:** Fall 2022  
**Course Outline Review Date:** 2025-09-01

**Program Area:** Math and Sciences

### Description:

MATH 202 extends the theory of integration to multivariate functions. Multiple integrals are introduced and applied, then further extended to general curves and surfaces in space. This course is intended for science and engineering students. It is a continuation of MATH 201. Presents theory relating to integration, gradients, curl, and divergence in a variety of coordinate systems. Theorems of Green, Stokes, and Gauss are presented.

### Program Information:

This course is a required course for a Bachelor of Science degree in most universities. It can be used as three of the six units in Calculus, which are required for an Associate of Science degree at College of the Rockies. A student should take MATH 201 and 202, or MATH 205.

**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	

Practicum/Field Experience

Co-op/Work Experience

Other

Total	45
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### Course Requisites:

- Completed the following:
  - **MATH201** – Multivariable 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:

Hass, Joel R., Heil, Christopher E., Weir, Maurice D., *Thomas' Calculus, Early Transcendentals*, 14th Edition, Pearson Educator (2018)

*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.*

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## Learning Outcomes:

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

- calculate double and triple integrals in Cartesian polar, cylindrical and spherical coordinates; switch between the various coordinate systems; use the Jacobian to make general substitutions in double and triple integrals;
- calculate line integrals; work; circulation;
- identify conservative fields and construct potential functions for them;
- calculate surface integrals; flux; and
- use the theorems of Green, Stokes and Gauss to calculate integrals.

This course should help students:

- 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; and
  - identify, interpret, and solve problems, effectively implementing and evaluating proposed strategies.
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## Course Topics:

Multiple integration

– Double and Iterated integrals

\* In Cartesian coordinates

Over General Regions

\* In polar coordinates

\* Areas, moments, centres of mass

– Triple integrals

\* In Cartesian coordinates

\* In cylindrical and spherical coordinates

\* Volumes, moments, centres of mass

– Substitutions; the Jacobian

## Integrals and Vector Fields

– Line integrals

– Work; circulation, and flux

– Conservative fields; path independence; potential functions

– Green's theorem in the Plane

– Surfaces and Area

– Surface integrals

– Stokes' theorem

– Divergence theorem and a Unified Theory

*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
Assignments	20%
Midterm Test(s)	30%
Final Exam	50%
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.

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### **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.