MATH-202 – Vector Calculus

University Arts and Science

Effective Term & Year: Fall 2025
Course Outline Review Date: 2030-04-01

Program Area: Math and Sciences

Description:

MATH 202 presents the tools of calculus when applied to vector valued functions. The mathematics of vectors are introduced and applied to describing lines, planes, cylinders and surfaces. The calculus used to analyze vector fields is then introduced, including classification as a conservative field; the formulation and calculation of line integrals and flux through a surface; Green's theorem, the calculation of the curl and divergence; Stokes' theorem and the Divergence theorem.

Program Information:

This course can be used as either a required or an elective course in an Associate of Science degree, with transfer to several degree programs at other institutions. It is recommended for second-year university transfer students wishing to major in mathematics.

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

Course Requisites:

- Completed the following:
  - MATH201 – Multivariable Calculus (3)

Prior Learning and Recognition: Yes

Students are able to request formal recognition of their prior learning or experience outside the classroom. Challenge examination, portfolio-assisted assessment, work-based assessment or a combination of assessments that is appropriate to identify, assess, and recognize prior skills, competencies, and knowledge to achieve course credit. Tuition fees apply, refer to Policy 2.5.5 Prior Learning Assessment and Recognition (PLAR) or 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 Columba 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.

Learning Outcomes:

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

- Calculate basic vector operations including the dot and cross product;
- Use vectors to describe surfaces including planes, the intersections of planes, cylinders and quadratic surfaces;
- Calculate line integrals; work; circulation;
- Calculate the curl or divergence of a vector field;
- 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.

Course Topics:

- Vectors and Geometry of Space
    - Three-Dimensional Coordinate Systems
    - Vectors
    - Dot and cross products
    - Lines and planes in Space
    - Cylinders and quadric surfaces
    - Differentiation rules of vector valued functions
- Integrals and Vector Fields
    - Line integrals
    - Conservative fields; path independence; potential functions
    - Work; circulation, and flux
    - Divergence and Curl of a vector field
    - Green’s theorem
    - Parametric 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

No pass requirements available.

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 2.1.4 Course Audit
- Policy 2.4.1 Credential Framework
- Policy 2.4.3 Students with Documented Disabilities
- Policy 2.4.4 Student Rights, Responsibilities and Conduct
- Policy 2.4.8 Academic Performance
- Policy 2.4.9 Student Feedback and Concerns
- Policy 2.4.11 Storage of Academic Works
- Policy 2.5.3 Student Appeal
- Policy 2.5.5 Prior Learning Assessment and Recognition (PLAR)

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.