Vector Calculus – MATH 202
University Studies Program

Course Outline

COURSE IMPLEMENTATION DATE:	**Pre 1998**
OUTLINE EFFECTIVE DATE:	**January 2020**
COURSE OUTLINE REVIEW DATE:	**September 2025**

GENERAL COURSE 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: This course is delivered face to face.

COTR Credits: 3

Hours for this course: 45 hours

Typical Structure of Instructional Hours:

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

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:

Ben Tippett, Ph.D.

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Signature

APPROVAL SIGNATURES:

Department Head	Dean of Business and University Studies
Erin Aasland Hall	Darrell Bethune
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Department Head Signature

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Dean Signature

EDCO

Valid from: January 2020- September 2025

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Education Council Approval Date

COURSE PREREQUISITES AND TRANSFER CREDIT:

Prerequisites: MATH 201

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 or 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:

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

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.

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

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- 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 ASSESSMENT (Face to Face Delivery):

Assignments	% Of Total Grade
Assignments	20%
Midterm Test(s)	30%
Final Exam	50%
Total	100%

Please see the instructor's 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.