UNIVERSITY OF THE FRASER VALLEY

OFFICIAL UNDERGRADUATE COURSE OUTLINE (page 1)

COURSE IMPLEMENTATION DATE:	September 1998
COURSE REVISED IMPLEMENTATION DATE:	September 2012
COURSE TO BE REVIEWED:	September 2009
(six years after UEC approval)	*(month, year)*

OFFICIAL UNDERGRADUATE COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.
Shaded headings are subject to change at the discretion of the department – see course syllabus available from instructor

MATH 211	SCIENCE/MATH & STATS	3
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS

CALCULUS III
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course extends the concepts of first-year calculus from the one-variable setting to a multi-variable setting. Topics include 3-dimensional analytic geometry, euclidean spaces, partial derivatives and gradient, optimization, multiple integrals, and applications.

PREREQUISITES: C or better in one of the following: MATH 112, MATH 116, or MATH 118
COREQUISITES:
PRE or COREQUISITES:

SYNONYMOUS COURSE(S):
(a) Replaces: ______
(b) Cross-listed with: ______
(c) Cannot take: ______ for further credit.

SERVICE COURSE TO: *(department/program)*

TOTAL HOURS PER TERM: **45**
STRUCTURE OF HOURS:

Lectures:	**45**	Hrs
Seminar:		Hrs
Laboratory:		Hrs
Field experience:		Hrs
Student directed learning:		Hrs
Other (specify):		Hrs

TRAINING DAY-BASED INSTRUCTION:
Length of course: ______
Hours per day: ______

OTHER:
Maximum enrolment: **36**
Expected frequency of course offerings: Every year
(every semester, annually, every other year, etc.)

WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☒ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	☐ Yes	☐ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☒ Yes	☐ No

Course designer(s): **Joseph Yu**

Department Head:	**Greg Schlitt**	Date approved:	**December 15, 2011**
Supporting area consultation **(Pre-UEC)**		Date of meeting:	**February 3, 2012**
Curriculum Committee chair:	**Norm Taylor**	Date approved:	**January 27, 2012**
Dean/Associate VP:	**Ora Steyn**	Date approved:	**February 10, 2012**
Undergraduate Education Committee (UEC) approval		Date of meeting:	**March 2, 2012**

LEARNING OUTCOMES:

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

- graph points and vectors in Cartesian 3-space, calculate with the vector operations of addition and scalar multiplication, interpret geometrically
- calculate the dot product and cross product in 3-space, interpret geometrically, use the interpretation to construct elementary arguments for various geometric facts or to test elementary statements, establish elementary facts about vector algebra from the definitions
- given various constraints, construct equations and systems of equations for lines and planes in 3-space, use the equations to establish elementary properties thereof
- graph points in the polar, cylindrical and spherical coordinate systems, convert between coordinate systems, graph curves and surfaces given parametrizations, and construct parametrizations for simple equational varieties.
- use multivariable functions in Cartesian, polar, cylindrical and spherical coordinate systems: determine domain, graph lines and surfaces (via trace), model real-world problems
- calculate limits of multivariable functions, define and test for continuity
- calculate partial derivatives, interpret the results of the calculations in real-world contexts, establish elementary propositions
- calculate gradient and directional derivatives, interpret the results in real-world contexts, and establish elementary propositions
- calculate tangent planes and normal lines to a given surface and establish elementary propositions
- find the extrema of functions of two or more variables on various domains, including using the technique of Lagrange multipliers, apply to solve real-world optimization problems
- set-up the appropriate iterated integral to integrate functions over a given region in the plane or 3-space, in Cartesian, polar, cylindrical and spherical coordinates, in particular to calculate surface area, volume etc.
- convert given multiple integrals between coordinate systems with Jacobians
- clearly state and interpret the central definitions for all the topics discussed above
- clearly state and interpret the central theorems for all the topics discussed above.

METHODS: *(Guest lecturers, presentations, online instruction, field trips, etc.)*

The course will be primarily lecture-based. Evaluation will include quizzes, midterm exams, assignments and a final exam.

METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

☐ Examination(s) ☐ Portfolio assessment ☐ Interview(s)

☒ Other (specify): Course Challenge

☐ PLAR cannot be awarded for this course for the following reason(s):

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

The text is chosen by a departmental curriculum committee. An example of texts for this course might be:
Multivariable Calculus (7 ed) by Larson, Hostetler and Edwards, Houghton and Mifflin (2002)

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

The weighting of the course may vary from instructor to instructor, although there must be at least two midterm exams and a comprehensive final exam which must be worth at least 40% of the final grade. A student must obtain at least 40% on the final exam to pass the course. An example of student evaluation for this course:

Quizzes and Assignments	20%
Midterm exams (2)	40%
Final Exam	40%

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

I Vectors and the Geometry of Space
1. vectors in the plane
2. cylindrical and spherical coordinates
3. the dot product of two vectors
4. the cross product of two vectors in space
5. lines and planes in space
6. surfaces in space
7. cylindrical and spherical coordinates

II Functions of several variables
1. limits and continuity of several variables
2. partial derivatives and chain rules
3. directional derivatives and gradients
4. tangent planes and normal lines
5. extrema of function of two variables and applications

III Multiple Integration
1. iterated integrals and area in the plane
2. double integrals and volume
3. change of variables: polar coordinates
4. surface area
5. triple integrals and applications
6. triple integrals in cylindrical and spherical coordinates
7. change of variables: Jacobians