UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE: January 2006
COURSE REVISED IMPLEMENTATION DATE:
COURSE TO BE REVIEWED: September 2009
(Four years after UPAC Final Approval Date) (MONTH YEAR)

OFFICIAL 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 and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT: **Science, Health & Human Services / Mathematics & Statistics**

MATH 340		**3**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

Introduction to Analysis
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course provides an introduction to some of the fundamental ideas of mathematical analysis; the subject which forms the rigorous foundation for calculus. Topics include: limits and convergence of sequences and functions, continuity, differentiability, Cauchy sequences, the Extreme and Mean Value theorems, uniform continuity, convergence and uniform convergence of infinite series, Taylor series, the Riemann integral, and improper integrals.

Note: Students who have credit for Math 214 or Math 320 may not take Math 340 for further credit.

PREREQUISITES: **Math 265**
COREQUISITES:

SYNONYMOUS COURSE(S)
(a) Replaces: _____ *(Course #)*
(b) Cannot take: **Math 214, Math 320** *(Course #)* for further credit.

SERVICE COURSE TO: _____ *(Department/Program)* _____ *(Department/Program)*

TOTAL HOURS PER TERM: **60**
STRUCTURE OF HOURS:

Lectures:		Hrs
Seminar:	**60**	Hrs
Laboratory:		Hrs
Field Experience:		Hrs
Student Directed Learning:		Hrs
Other (Specify):		Hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE: _____
HOURS PER DAY: _____

MAXIMUM ENROLLMENT: **36**
EXPECTED FREQUENCY OF COURSE OFFERINGS: **Every second year**

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

AUTHORIZATION SIGNATURES:

Course Designer(s): Ian Affleck/Greg Schlitt/Erik Talvila
Chairperson: Gillian Mimmack *(Curriculum Committee)*
Department Head: Gillian Mimmack
Dean: Jacalyn Snodgrass
PAC Approval in Principle Date:
PAC Final Approval Date: September 30, 2005

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

This course wil provide a rigorous treatment of analysis, which is the foundation of calculus. On completion of the course, the successful student will be able to:

1. Exhibit an understanding of the notion of convergence and limit by stating definitions and using formal epsilon-N-delta arguments to prove the convergence of sequences and series and to prove the continuity and differentiability of functions.
2. Prove basic theorems in analysis using accepted mathematical reasoning and proof structure.
3. Demonstrate the importance of continuity, differentiability and integrability by applying theorems such as the Extreme Value theorem, the Mean Value theorem, and Fundamental theorem of calculus.
4. Define the Riemann and improper Riemann integrals and prove their fundamental properties.
5. Prove convergence theorems for series such as the Ratio test and apply them to test convergence of series.
6. Use tests such as the Weierstrass M-test to prove uniform convergence of series and integrals.
7. Use Taylor polynomials to approximate smooth functions and give precise error estimates on the approximation.

METHODS:

This course is primarily lecture-based. Evaluation includes quizzes, tests and a final exam.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check:) ☒ Yes ☐ No

METHODS OF OBTAINING PLAR:

Please check online at http://www.ucfv.ca/math/challenge.htm for the departmental challenge policy.

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.

Recommended texts are:

R. G. Bartle and D. Sherbert. 2000. Introduction to Real Analysis. Wiley.
S.K. Berberian. 1994. A First Course in Real Analysis. Springer Verlag.
W. Rudin. 1976. Principles of Mathematical Analysis. McGraw-Hill.

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

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

Assignments	20%
Quizzes	10%
Midterm Exams (2)	30%
Final Exam	40%

Students must achieve at least 40% on the final exam in order to pass this course.

COURSE CONTENT:

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

I. Limits, Continuity, Differentiability:
1. Limit of a sequence, Cauchy sequences, Bolzano-Weierstrass property
2. Limit of a function
3. Continuity
4. Differentiability

II. Applications of continuity and differentiability:
1. Extreme Value theorem
2. Mean Value theorem
3. Fundamental theorem of calculus

4. Uniform continuity

III. Infinite Series:

1. Series of constants - convergence, proofs of convergence tests
2. Series of functions - convergence, uniform convergence, tests for uniform convergence - Weierstrass M-test, Abel and Dirichlet tests - continuity and differentiability of functions defined using series
3. Taylor series - uniform approximation by polynomials, analytic functions

IV. Integrals

1. The Riemann integral
2. Improper integrals - absolute and conditional convergence
3. Integrals that depend on a parameter - uniform convergence