UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE:	September 1999
COURSE REVISED IMPLEMENTATION DATE:	September 2006
COURSE TO BE REVIEWED:	December 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: **Faculty of Science, Health & Human Services / Physics**

COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS
ENGR 255		**3**

Ordinary Differential Equations
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

Most mathematical models of a physical process are in the form of differential equations. This course provides various techniques and ideas in solving ordinary differential equations with an emphasis on applications. Graphing calculators and Maple are used in this course. Topics include first- and second-order linear differential equations, non-linear equations, series solutions, Laplace transform methods, and linear systems.

Note: This course is also offered as MATH 255. Students can receive credit for only one of MATH 255 and ENGR 255.

PREREQUISITES: **MATH 112**
COREQUISITES: **Prerequisites or Corequisites: MATH 211 and one of MATH 152, MATH 221, PHYS 221.**

SYNONYMOUS COURSE(S)
(a) Replaces: _____ *(Course #)*
(b) Cannot take: **MATH 255** *(Course #)* for further credit.

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

TOTAL HOURS PER TERM: **60**

STRUCTURE OF HOURS:

Lectures:	**55**	Hrs
Seminar:		Hrs
Laboratory:	**5**	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:	**Fall semester**	
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): David Chu / Erik Talvila
Chairperson: Gillian Mimmack *(Curriculum Committee)*
Department Head: Norm Taylor
Dean: Jacalyn Snodgrass
UPAC Approval in Principle Date:
UPAC Final Approval Date: May 26, 2006

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

The main objectives of this course are (i) to provide various techniques and ideas in solving ordinary differential equations and (ii) to use technology to solve mathematical models in the form of differential equations.

The successful student will be able to:
1. solve first-order linear differential equations by recognizing the equations as separable and/or exact;
2. understand and apply the Existence and Uniqueness Theorem;
3. construct and solve first-order difference equations with applications;
4. solve second-order homogeneous linear equations with constant coefficients, find the fundamental solutions, test linear independence and calculate Wronskian;
5. solve second-order nonhomogenous equations by the method of undetermined coefficients and variation of parameters;
6. derive, solve and interpret vibrational models;
7. find series solutions of second-order linear equations near an ordinary point and a reqular point;
8. understand the idea of Laplace transform and apply to different elementary functions, solve differential equations involving step functions and impulse functions;
9. solve homogeneous linear systems with constant coefficients;
10. formulate mathematical models and use technology to solve them.

METHODS:

Lectures and demonstration of Maple in computer lab.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

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

METHODS OF OBTAINING PLAR:

Please see the Physics PLAR policy on the department's webpage

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.

The suggested texts are as follows:
1. Boyce and DiPrima. Elementary Differential Equations. 7th edition. Wiley.
2. Zill. A First Course in Differential Equations with Modeling Applications. 7th edition. Brooks/Cole.

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

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

Assignments	15%
Quizzes	15%
Tests	30%
Final Examination	40%

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

COURSE CONTENT:

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

Use of graphing calculator and Maple is expected.

1. Direction fields, mathematical models.
2. First-order linear and non-linear differential equations, separable equations, autonomous equations, population dynamics, exact equations, integrating factors.
3. The Existence and Uniqueness Theorem (without proof).
4. First-order difference equations.

5. Second-order homogenoue linear equations with constant coefficients, linear independence, Wronskian, characteristic equation.
6. Nonhomogeneous equations, method of undetermined co-efficients, variation of parameters, vibrational models.
7. series solutions near an ordinary point and a regular single point, Euler equations.
8. Laplace transform, step functions, discontinuous forcing functions, impulse functions.
9. Systems of first-order homogeneous linear equations with constant co-efficients, eigenvalues.