OFFICIAL UNDERGRADUATE COURSE OUTLINE (page 1)

UNIVERSITY OF THE FRASER VALLEY

COURSE IMPLEMENTATION DATE:	September 1999
COURSE REVISED IMPLEMENTATION DATE:	September 2012
COURSE TO BE REVIEWED:	September 2011
(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 255	SCIENCE/MATH & STATS	3
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS

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 offered as MATH 255 and ENGR 255. Students may take only one of these for credit.

PREREQUISITES: MATH 112 or at least a B in Math 118
COREQUISITES:
PRE or COREQUISITES: MATH 211 and one of MATH 152, MATH 221, or PHYS 221

SYNONYMOUS COURSE(S):
(a) Replaces:
(b) Cross-listed with: ENGR 255
(c) Cannot take: ENGR 255 for further credit.

SERVICE COURSE TO: *(department/program)*

TOTAL HOURS PER TERM: **45**

STRUCTURE OF HOURS:

Lectures:	**40**	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:

OTHER:
Maximum enrolment: **36**
Expected frequency of course offerings: Annually
(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):	**David Chu/Erik Talvila**		
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:

1. solve first-order linear differential equations by recognizing the equations as separable and/or exact;
2. state, interpret 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 regular point;
8. define the the Laplace transform and apply the technique 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: *(Guest lecturers, presentations, online instruction, field trips, etc.)*

Lectures and demonstration of Maple in computer lab.

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. Examples 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.