UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE:
COURSE REVISED IMPLEMENTATION DATE: September 1996
COURSE TO BE REVIEWED: September 2000
(Four years after implementation 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: **NATURAL SCIENCES**

PHYSICS 221		**4**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

MECHANICS (INTERMEDIATE)
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

The object of this course is to extend the concepts studied in Physics 101 and 111. Topics covered in this course include: kinematics; orthogonal curvilinear coordinate systems; mathematical physics; dynamics; energy; momentum; free, forced, coupled and damped oscillations; gravitation; and special relativity. The course will be presented using lectures and laboratory experiments. Emphasis will be equally shared between applied and theoretical physics. Students indicating specific interests will be assigned problems relevant to those interests.

PREREQUISITES: **PHYSICS 111/112 or PHYSICS 101/105 with B+ average**
COREQUISITES: **MATH 211**

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

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

TOTAL HOURS PER TERM: **105**

STRUCTURE OF HOURS:

Lectures:	**60**	Hrs
Seminar:		Hrs
Laboratory:	**30**	Hrs
Field Experience:		Hrs
Student Directed Learning:	**12**	Hrs
Other (Specify): Exams (done in lab periods)	**3**	Hrs

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

MAXIMUM ENROLLMENT: _____
EXPECTED FREQUENCY OF COURSE OFFERINGS: _____

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): _____ George McGuire
Chairperson: _____ *(Curriculum Committee)*
Department Head: _____ Tim Cooper
Dean: _____ J.D. Tunstall, Ph.D.
PAC Approval in Principle Date:
PAC Final Approval Date: February 28, 1996

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

If successful in this course, students should be able to:
1. Understand the fundamental concepts and laws involved in classical mechanics and relativity. To demonstrate this understnading by solving a wide variety of problems.
2. Have some knowledge and understanding of the basic principles as applied to instruments and apparatus.
3. Apply the classroom learning in the laboratory.
4. Feel confident about continuing their career in a science-related field.

METHODS:

This course will be presented using lectures and laboratory experiments. Audio-visual aids will be used whenever appropriate. Computer-assisted learning programs will be used to increase the understanding of the concepts being studied. Problem sets will be assigned and graded for each chapter studied.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

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

METHODS OF OBTAINING PLAR:

TEXTBOOKS, REFERENCES, MATERIALS:

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

TEXTS: Fowles, Analytical Mechanics, 4th ed., HBJ, 1986

REFERENCES:

1. Alonso & Finn, Fundamental University Physics, Vol. I
2. A.P. French, Newtonian Mechanics
3. Halliday & Resnick, Physics, Part I, J. Wiley
4. Kleppner & Kolenkow, An Introduction to Mechanics, McGraw-Hill
5. A. Douglas Davis, Classical Mechanics, Academic Press, 1986

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

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

Assignments	20%
Laboratory Work	15%
Mid-term	25%
Final Exam	40%

COURSE CONTENT:

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

Kinematics: motion in one and two dimensions; dissipative forces; forces as function of time, position, and velocity

Harmonic Oscillator: simple harmonic oscillator, power series representation of an arbitrary function, anharmonic oscillators, damped and forced oscillators

Vectors: vector algebra, vector multiplication, coordinate systems, vector calculus, vector differential operators (gradient, divergence, and curl)

Coordinate Systems: plane polar coordinates, cylindrical coordinates, spherical coordinates, moving and rotating coordinate systems, vector differential operators in spherical and cylindrical coordinate systems

Central Forces: potential energy and central forces, angular momentum and central forces, inverse square law and ellipses,

Kepler's laws

Systems of particles: momentum, momentum with variable mass (rockets), collisions, centre of mass

Rigid Bodies: centre of mass, angular momentum, rotation about a fixed axis, moment of inertia, conservation of energy and momentum

Lagrangian Mechanics: generalized coordinates, Lagrange's equations, elementary examples, applications, systems with constraints

LABORATORY EXPERIMENTS:

Graphical Analysis and Theory of Errors
Graphical Analysis of Vectors (Acceleration Due to Gravity from Projectile Motion)
Dissipative Forces (F V)
Dissipative Forces (F V2)
Anharmonic Motion
Damped Harmonic Motion
Coupled Harmonic Motion
Forced Oscillations
Compound Pendulum
Moment of Inertia