UNIVERSITY COLLEGE of the FRASER VALLEY

PAC FORM #2

COURSE IMPLEMENTATION DATE:[**June 1993**]
Revised: August 2000
COURSE TO BE REVIEWED DATE:[**August 2004**]
(Four years after implementation date)

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 material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT: **PHYSICS**

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

INTERMEDIATE MECHANICS

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course extends the topics covered in Physics 111. Topics covered kinematics, motion in polar coordinates, Newton's laws, momentum work, some mathematical aspects of physics and vector analysis (gradient, divergence, curl, Stokes' theorem and Gauss's law), angular momentum, forced and damped harmonic motion, central forces and Lagrangian mechanics. The laboratory portion of the course includes experiments designed to supplement the theory covered in class.

PREREQUISITES: PHYS 111/112 or 101/105 with a B+ average

PRE- OR CO-REQUISITES: MATH 211

SYNONYMOUS COURSE(S)

(a) Replaces: N/A
(Course #)

(b) Cannot take N/A for further credit
(Course #)

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):		hrs
Exams (done in lab period)	3	

TRAINING DAY-BASED INSTRUCTION

LENGTH OF COURSE:

HOURS PER DAY:

MAXIMUM ENROLMENT: **24**

EXPECTED FREQUENCY OF COURSE OFFERING: Once per year

WILL TRANSFER CREDIT BE REQUESTED? **YES** X **NO**

TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE: **YES** X **NO**

AUTHORIZATION SIGNATURES:

Course designer(s): George McGuire

Chairperson: *(Curriculum Committee)*

Department Head: George McGuire

Dean: J. Snodgrass

PAC Approval in Principle Date:

PAC Final Approval Date: Sept 2000

PHYS 221

COURSE NAME / NUMBER

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, and to demonstrate this understanding by solving a wide variety of problems;
2. have some knowledge and understanding of the basic principles being studied as applied to instruments and apparatus;
3. apply the classroom learning in the laboratory;
4. feel confident about taking further courses in physics or engineering.

METHODS:

This course will be presented using lectures and laboratory experiments. Audio-visual aids will be used where 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. Close coordination will be maintained between laboratory and classroom work whenever possible.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR YES ___X___ NO ___X___

METHODS OF OBTAINING PLAR:

By portfolio.

TEXTBOOKS, REFERENCES, MATERIALS:

TEXT:

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:

Assignments	20%
Laboratory work	15%
Mid-term examination	25%
Final examination	40%

PHYS 221

COURSE NAME / NUMBER

COURSE CONTENT:

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:

1. Graphical Analysis and Theory of Errors
2. Graphical Analysis of Vectors (Acceleration due to gravity from projectile motion)
3. Dissipative Forces (F % V)
4. Dissipative Forces (F % V)
5. Anharmonic Motion
6. Damped Harmonic Motion
7. Coupled Harmonic Motion
8. Forced Oscillations
9. Compound Pendulum
10. Moment of Inertia