OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use. + see course syllabus available from instructor

FACULTY/DEPARTMENT: PHYSICS 221
NATURAL SCIENCES

COURSE NAME/NUMBER FORMER COURSE NUMBER UCFV CREDITS
MECHANICS (INTERMEDIATE)

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: PHYS 101/102, B+ or better; or PHYS 111/112
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 3 Hrs (done in lab periods)

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

COURSE IMPLEMENTATION DATE: January 1996
COURSE REVISED IMPLEMENTATION DATE: January 2000
COURSE TO BE REVIEWED: January 2000
(Month Year)

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: November 29, 1995
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 understanding 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:]


REFERENCES:

1. Alonso & Finn, Fundamental University Physics, Vol. I
2. A.P. French, Newtonian Mechanics
3. Halliday & Resnick, Physics, Part I, J. Wiley

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