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Part II: SYLLABUS OF RECORD

PHYS 441/541 Classical Mechanics

I. Catalog Description

PHYS 441 Classical Mechanics

3c-01-3cr

Co-requisite: MATH 241 or permission of the physics department

mechanics of a particle, and a system of particles in one, two, and three dimensions. Central forces, planetary, and satellite motion, rotation, oscillations, and conservation laws in the Newtonian formulation of classical mechanics will be included. In addition the Lagrangian formulation of classical mechanics will be developed and used to solve dynamical problems for various mechanical systems.

II. Course Outcomes

- 3) unit vectors
- 4) velocity and acceleration in various coordinates systems
- 5) gradient operator

ii. Newtonian Mechanics

(18 academic hours)

A. Newton's Law

- 1) inertia, momentum, and force
- 2) general motion of a particle in a resisting medium
- 3) motion of a projectile in a resisting medium
- 4) motion with variable mass

B. Conservation Laws

- 1) single particle
 - a) linear momentum
 - b) angular momentum
 - c) work and energy
- 2) system of particles
 - a) rotational motion
 - b) of center of mass
 - c) moment of inertia
 - d) linear momentum
 - e) angular momentum
 - f) work and energy

C. Central Forces

- 1) Universal law of Gravitation
- 2) field vector
- 3) gravitational potential and potential energy

D. Forces in Accelerated Frames of Reference

- 1) inertial forces
- 2) non-inertial forces

iii. Oscillations

(8 academic hours)

A. Linear Oscillations

- 1) simple harmonic oscillator
- 2) damped oscillations
 - a) mechanical
 - b) electrical

B. Forced Oscillations

- 1) sinusoidal driving force
- 2) transient effects
- 3) driven electrical oscillations
- 4) Fourier series

iv. Hamilton's Principle

(8 academic hours)

Two exams (2 academic hours)
Final Exam (2 academic hours)

IV. Evaluation Methods

The final grades for the course will be based upon the following:

- 50% Exams. A minimum of two fifty minute in-class examinations consisting of problem solutions or essay exercises.
- 25% One two-hour final examinations
- 25% Homework and class participation. Students are expected to participate in the

V. Example Grading Scale

- A 90%-100%
- B 80%-89%
- C 70%-79%
- D 60%-69%
- F less than 69%

VI. Required Textbooks

Potential Textbooks include but are not limited to:

- Analytical Mechanics, Taylor, University Science Books, Sausalito, CA, 2005
- Analytical Mechanics 6th ed., G. R. Fowles and G. L. Cassiday, Brooks-Cole, Toronto, 1999

VII. Attendance Policy

Attendance and enforcement thereof shall be in accord with the general guidelines provided in the official university "Undergraduate Course Attendance Policy"

VIII. Special Resource Requirements

Scientific calculator, Textbook, Notebook, paper, pen or pencil. No laboratory fee.

Course Analysis Questionnaire

A1 How does this course fit into the programs of the department? For what students is the course designed? (majors, students in other majors, liberal studies) The proposed course

will replace the existing PHYS 222 and PHYS 223 – a two semester sequence for a total of four credit hours which covers intermediate and advanced levels. Both semesters are not currently suitable or required for all the physics department programs and as a

result it is impossible to insure adequate enrollment in both courses concurrently. The

C1 Are faculty resources adequate? **Resources are adequate.** If you are not requesting or have not been authorized to hire additional faculty, demonstrate how this course will fit

Appendix for Graduate course

I. Catalog description

PHYS 541 Classical Mechanics

3c-01-3cr

Prerequisites: permission of the physics department

mechanics of a particle, and system of particles in one, two, and three dimensions.

Central forces including planetary and satellite motion, rotation, oscillations, waves