UPAC FORM #2 (Page 1)

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: Faculty of Science, Health and Human Services/Physics

PHYS 321  3

COURSE NAME/NUMBER FORMER COURSE NUMBER UCFV CREDITS

Advanced Mechanics

CALENDAR DESCRIPTION:

The object of this course is to extend the concepts studied in PHYS 221. Topics to be covered include: Newtonian mechanics, oscillations, gravitation, central forces, motion in noninertial reference frames, Hamilton's Principle and Lagrange's equations, systems of particles, dynamics of rigid bodies. Although this course has no lab component, the emphasis will be shared equally between the theoretical and the applied aspects of the physics being studied.

PREREQUISITES: PHYS 221

COREQUISITES: Pre- or co-requisite PHYS 381, PHYS 382 or 383 (Advanced Mechanics Group of experiments) s recommended

SYNONYMOUS COURSE(S)

(a) Replaces: n/a

(b) Cannot take: n/a

SERVICE COURSE TO:

TRAINING DAY-BASED INSTRUCTION

TOTAL HOURS PER TERM: 75

LECTURES: 75 Hrs

SEMINAR: Hrs

LABORATORY: Hrs

FIELD EXPERIENCE: Hrs

STUDENT DIRECTED LEARNING: Hrs

OTHER (SPECIFY): Hrs

MAXIMUM ENROLLMENT: 24

EXPECTED FREQUENCY OF COURSE OFFERINGS: Once every 2-3 yrs

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: June 1993

COURSE REVISED IMPLEMENTATION DATE: September 2007

COURSE TO BE REVIEWED: May 2010

AUTHORIZATION SIGNATURES:

Course Designer(s): Tim Cooper

Chairperson: Gillian Mimmack (Curriculum Committee)

Department Head: Norm Taylor

Dean: Jackie Snodgrass

UPAC Approval in Principle Date: June 1993

UPAC Final Approval Date: May 26, 2006
LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

1. To increase the students’ knowledge of Newtonian mechanics.
2. To increase the students’ awareness of the important role Newtonian mechanics has played in the development of all the sciences.
3. To provide the knowledge and the discipline needed to continue a career in physics.
4. To provide an opportunity for the students to experience the joy of thinking.

Students should be aware that, as per departmental policy: All instructors teaching physics courses will be expected to cover all of the material in the course content section in the official course outlines.

METHODS:

This course will be taught using lectures, demonstrations, and computer simulations. Problems will be assigned and marked on a regular basis.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

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

METHODS OF OBTAINING PLAR:

Please see the Physics PLAR policy on the department’s webpage.

TEXTBOOKS, REFERENCES, MATERIALS:

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

Text:

References:

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

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

The marks earned in this course will be calculated from the assignment grade, the midterm and final exams.

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>25%</td>
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<tr>
<td>Midterm Exam</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
<td>45%</td>
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COURSE CONTENT:

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

1. Newtonian Mechanics (a review)
   Newton's Law, Conservation Theorems, Rocket motion, limitations of Newtonian mechanics
2. Oscillations (a review)
   damped and forced, sinusoidal driving forces, Fourier series, impulsive forces
3. Central Forces and Gravitation
   orbits in a central field, reduced mass, effective potential, orbital dynamics
4. Methods in the Calculus of Variations  
   Euler's Equation, functions with several dependent variables

5. Hamilton's Principle and Lagrangian Dynamics  
   General coordinates, Lagrangian Dynamics, Hamiltonian Dynamics, phase space

6. Systems of Particles  
   Centre of Mass, Linear Momentum, Angular Momentum, Collisions

7. Non-inertial Reference Frames  
   Rotating Coordinate Systems

8. Dynamics of Rigid Bodies  
   Angular momentum, moments of inertia, Inertia Tensor, Eulerian Angles

9. Coupled Oscillators, Vibrating Strings

10. Group Velocity, Phase Velocity and Wave Packets