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

PHYSICS 321       3
COURSE NAME/NUMBER FORMER COURSE NUMBER UCFV CREDITS
Advanced Mechanics

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:
The object of this course is to extend the concepts studied in Physics 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:  Physics 221
COREQUISITES:  Pre- or co-requisite Physics 381

SYNONYMOUS COURSE(S)
(a) Replaces:  n/a 
(b) Cannot take:  n/a  for further credit.

SERVICE COURSE TO:

TOTAL HOURS PER TERM:  75
STRUCTURE OF HOURS: 
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  □

AUTHORIZATION SIGNATURES:
Course Designer(s):  Tim Cooper  Chairperson:  Gillian Mimmack (Curriculum Committee)
Department Head:  Norm Taylor  Dean:  Jackie Snodgrass
UPAC Approval in Principle Date:  UPAC Final Approval Date:  December 14, 2005
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.

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:
Departmental Review and/or Course Challenge

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