

PHYS3113 Mechanics I

Department: Mathematics, Physics and Engineering

Credit Hours: 3

Required or Elective (circle one)

Current Catalog Description:

Particle dynamics in one, two, and three dimensions; conservation laws; dynamics of a system of particles; motion of rigid bodies; central force problems.

Course Schedule:

3 lecture hr/wk

Textbook(s):

Analytical Mechanics, 8th Ed., Fowles and Cassiday, 2004

Schaum's Outlines Mathematical Handbook, 2nd Ed., Murray Spiegel, 1998

Coordinator:

Dr. Daniel K. Marble

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Course Web Page:

<http://www.math.tarleton.edu/faculty/marble/physics3313/main.htm>

Prerequisites by Topic:

PHYS2424 – Principles of Physics II (pre-requisite)

MATH2104 – Calculus III (co-requisite)

MATH3063 – Differential Equations (co-requisite)

Course Grading:

Exams/Homework/Quizzes (30% (best), 20%, 20%, 20%, 15% (worst))

Program Outcome and Course Learning Goals Map:

The Program Outcomes for Engineering Physics are:

- A. an ability to apply knowledge of math, engineering & science
- B. an ability to design and conduct experiments, as well as to analyze and interpret data
- C. an ability to design system, component or process to meet needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- D. an ability to function on multi-disciplinary teams
- E. an ability to identify, formulate, and solve engineering problems
- F. an understanding of professional and ethical responsibility
- G. an ability to communicate effectively
- H. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- I. a recognition of need for, and ability to engage in life-long learning
- J. a knowledge of contemporary issues
- K. an ability to use techniques, skills, and modern engineering tools necessary for engineering practice.
- L. a depth and breadth of knowledge in engineering and physics necessary to work in a multidisciplinary environment

Course Goals	Program Outcome(s):
Upon completion of this course, students will	
1. be able to apply vector mathematics including calculus to analyze mechanical systems.	A, L
2. know the basic definitions of position, velocity, acceleration and be able to use them to describe the motion of simple physical systems.	A, L
3. be able to state and apply Newton's Laws to analyze simple mechanical systems involving position and velocity dependent forces for both rectangular and non-rectangular coordinate systems.	A, L
4. be able to apply work and energy concepts to solve either problems involving only conservative forces or systems with sliding friction.	A, L
5. be able to apply the principle of conservation of linear momentum to solve problems involving isolated systems and collisions.	A, L
6. be able to apply conservation of angular momentum to analyze systems either involving collision or in which no net external torque is applied.	A, L
7. be able to apply transformation equations to compare measurements made by observers in reference frames which have been rotated and/or translated.	A, L
8. be able to analyze harmonic system with and without damping or external excitation.	A, L
9. be able to state apply Newton's Universal Law of Gravity use it to solve simple celestial mechanics problem.	A, L
10. be able to use generalized coordinates to find the Lagrangian and Hamiltonian of a simple mechanical system.	A, L
11. be able to apply Langrangian mechanics to solve for the motion of simple mechanical system.	A, L
12. be able to apply Hamiltonian mechanics to solve for the motion of simple mechanical system.	A, L

Academic Honesty:

Cheating, plagiarism (submitting another person's materials or ideas as one's own), or doing work for another person who will receive academic credit are all-impermissible. This includes the use of unauthorized books, notebooks, or other sources in order to secure or give help during an examination, the unauthorized copying of examinations, assignments, reports, or term papers, or the presentation of unacknowledged material as if it were the student's own work. Disciplinary action may be taken beyond the academic discipline administered by the faculty member who teaches the course in which the cheating took place.

Students with Disabilities Policy:

It is the policy of Tarleton State University to comply with the Americans with Disabilities Act (ADA) and other federal, state, and local laws relative to the provision of disability services. Students with disabilities attending Tarleton State University may contact the Office of Disability Services at (254) 968-9478 to request appropriate accommodation. Furthermore, formal accommodation requests cannot be made until the student has been officially admitted to Tarleton State University.

Contribution of Course to Meeting the Professional Requirement:

Math/Science Topics: 100%

Status of Continuous Improvement Review of this Course:

Prepared by: Daniel K. Marble

Date: September 19, 2004

Reviewed by: Jim McCoy
Date: May 9, 2005

Review notes:

Consider modifying Course Goal 6 to allow investigating the symmetric top. Consider modifying Course goal 5 to allow rocket motion in the vicinity of the earth. – jjm

Reviewed by: Daniel Marble
Date: July 9, 2008