Course Title	Course Code	Number of Study Hours			Year	Level	Prerequisites
		Theoretical	Laboratory	Credit			
Analytical Mechanics	351PHYS	3	---	3	3rd	8th	251PHYS

(1) Brief Course Description

This course emphasizes on the advanced physical concepts and mathematical techniques associated with dynamic systems. Special features of the course will be the introduction of Lagrangian and Hamiltonian methods to demonstrate the power of these methods in solving problems in mechanics. The course covers also the kinematics and dynamics of rigid bodies as well as the dynamics of many particles systems.

(2) Course Objectives

This course is designed to provide students with:
- Introduction to the concept of generalized coordinates and generalized forces
- Lagrangian and Hamiltonian Mechanics.
- Methods to solve complex problems of mechanics.
- Analytical methods commonly used to treat rigid bodies mechanics.
- Introduction to the many particles dynamics

(3) Course Contents
- Dynamics of systems of particles (center of mass and linear momentum of a system, Angular Momentum and Kinetic Energy of a system, Motion of two interacting bodies: The reduced Mass).
- Collisions (Oblique and scattering collisions).
- Rigid bodies mechanics (General theories and its applications on many types of motion, motion of rigid bodies in three dimensions.)
- Lagrangian Mechanics.
- Hamiltonian Mechanics.

(4) Assessment Criteria
- Mid -Term Exams: 20%
- Oral, Student Activity and Essay: 30%
- Final Exam: 50%

(5) Course Teaching Strategies
- Lectures, Reports and Essay Assignments, Homework, and Web-based Assignments.

(6) Text Book
- Analytical Mechanics; Grant R. Fowles and George L. Cassiday – 7th edition, Brooks, Cole, publishing, 2004.

(7) Reference Books
- Analytical Mechanics; Louis N. Hand and Janet D. Finch, Amazon.com, 1998.

Approved by:
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