Course Profile - Department of Physics

Course Number : PHYS 343	**Course Title :** Classical Mechanics
Required / Elective : Required	**Pre / Co-requisites :** -
Catalog Description: Elements of Newtonian mechanics; motion of particle; motion of system of particles; motion of rigid body; gravitation; central force problems; special theory of relativity. Principles of least action; Lagrange's equations of motion; Hamilton's equations of motion; theory of small vibrations.	**Textbook / Required Material :** S. T. Thornton & J. B. Marion, *Classical Dynamics of Particles and Systems*, Brooks Cole, 5th ed., 2003.
Course Structure / Schedule : (3+0+2) 4 / 8 ECTS	
Extended Description : Matrices, vectors and vector calculus. Newtonian mechnanics. Oscillations. Nonlinear oscillations and chaos. Gravitation. Calculus of variations. Hamilton's principle. Lagrangian and Hamiltonian mechanics. Central force motion. Dynamics of systems of particles. Noninertial frames. Rigid body dynamics. Coupled oscillations. Special relativity.	
Design content : None	**Computer usage**: Linking to course web site for homeworks and announcements, and to Course Online for homework and exam solutions. Optional use of Java applets.

Course Learning Outcomes [relevant program outcomes in brackets]**:**

On successful completion of this course students will be able to

1. demonstrate a conceptual understanding of the fundamental laws of classical mechanics [1, 2];
2. recognize how these physical laws can be applied to solve a variety of problems [6];
3. analyze the properties of translational and rotational motion using Lagrangian and Hamiltonian dynamics [1, 2];
4. employ calculus of variations and vector calculus to solve physical problems[1, 2];
5. describe planetary motion [1, 2];
6. explain small oscillations of dynamical systems [1];
7. compare relativistic and non-relativistic motion [1];
8. compare motion in inertial and non-inertial frames of reference [1];
9. discuss how physics is relevant to the world around them [5, 10].

Recommended reading

L. D. Landau & E. M. Lifshitz, Mechanics, Butterworth-Heinemann; 3 edition, 1976.

G. R. Fowles & G. L. Cassiday, *Analytical Mechanics,* Brooks Cole; International Ed., 2004

Teaching methods
Three lectures and two problem sessions per week; pre-readings and homework problems.

Assessment methods (Related to course outcomes)**:**

Two mid-term examinations, a final examination, weekly homework assignments, and quizzes.

Student workload:

Preparatory reading	45 hrs
Lectures, discussions	45 hrs
Exercise sessions	28 hrs
Homework	45 hrs
Independent work	32 hrs
Exams	5 hrs

TOTAL …… 200 hrs … to match 25 x 8 ECTS

Prepared by : Rahmi Guven, 06.02.2010	**Revision Date :**