PHYS121 Mechanics   15 Credits

Students will attend 36 teaching sessions which will consist of lectures, problems classes and a class test. Question Sheets will be set for students to do in their private study time. The recommended private study time for this module is 72 hours.

Organiser: Dr. T. Greenshaw.

Availability: Year 1 and Year 2.

Prerequisites: Physics: A-level or equivalent.
                     Mathematics: A-level or (MATH185 + PHYS118) or equivalent.

Lectures: Dr. T. Greenshaw.
                     Semester 1: Monday 12:00, Wednesday 10:00, Friday 12:00 (S6 and S7).

Practicals: None

Tutorials: None

Assessment: Marks for the module will be made up as follows:

                     75% by a two hour written examination at the end of Semester 1.
                     15% by a class test held during Semester 1.
                     10% for satisfactory submission of solutions to the Question Sheets.

                     Students who are judged unsatisfactory in the module may be allowed to take the resit examination.

Textbook: **"Fundamentals of Physics"** (Extended Fifth Edition) Halliday, Resnick and Walker, published by Wiley.

The Department's aims for the module are:

- To introduce the fundamental concepts and principles of classical mechanics at an elementary level.

- To provide an introduction to the study of fluids.

- To introduce the use of elementary vector algebra in the context of mechanics.

Learning Objectives:

At the end of the module the student should have:

- Acquired a basic knowledge of the laws of classical mechanics.

- Some familiarity with the application of the laws of mechanics to statics, linear motion, motion in a plane, rotational motion, simple harmonic motion and gravitation.

- An ability to apply mathematical methods, including simple vector algebra, to the study of mechanics.

- An understanding of some aspects of the behaviour of fluids.

Assessment Methods and Criteria:

In the examination the students will be assessed on the following:

- Comprehension of the material covered by the module.

- Ability to solve problems based on this material.

- Knowledge of key definitions and laws.

- Ability to derive key results from a given starting point.

- Ability to apply fundamental knowledge to solve problems demanding reasoning ability and understanding of the material covered in the module.

Marks in the examination will be awarded as follows:

- 50%   for a compulsory question comprising many short questions on a broad range of aspects of the module.

- 50%   shared equally between two compulsory and more extensive questions, each having internal choice between two options.

- The above will test knowledge, understanding and problem solving ability.

The class test will consist of many compulsory questions assessing:

- Comprehension of the material covered up to that point.

- Ability to solve problems based on the material.

- Ability to write down key definitions and laws.

Syllabus content:

Topics	Chapter (HRW)	Lectures/Probs classes
Vectors	3	1
Friction, drag, circular motion	4, 6	2
Work, kinetic energy and power	7	2
Conservation of energy	8	2
Systems of particles, rocket equation	9	2
Momentum, collisions, impulse	10	2
Rotation, angular quantities as vectors, moment of inertia	11	1

Topics	Chapter (HRW)	Lectures/Probs classes
Parallel axis theorem, torque	11	2
Angular momentum	12	1
Gyroscope, wheels, rolling	12	2
Centre of percussion, stability of spinning objects	12	1
Static equilibrium	13	1
Oscillations, simple harmonic motion	16	3
Energy in simple harmonic motion, forced oscillations, resonance	16	1
Gravity, shell theorem, mass of earth	14	2
Orbital motion	14	2
Fluids at rest	15	1
Fluids in motion	15	2

Module web site

http://hep.ph.liv.ac.uk/~green/mechanics