School of Mathematics

Module MA1242 — Mechanics II   2010-11
(JF Mathematics, JF Theoretical Physics & SF Two-subject Moderatorship)

Lecturer: Dr. Stefano Kovacs

Requirements/prerequisites: prerequisite: MA1241

Duration: Hilary term, 11 weeks

Number of lectures per week: 3 lectures including tutorials per week

Assessment:

End-of-year Examination: This module will be examined jointly with MA1241 in a 3-hour examination in Trinity term, except that those taking just one of the two modules will have a 2 hour examination.

Description:

- More on Momentum and Energy (flow of mass: dynamics of systems with varying mass, elastic and inelastic collisions, centre of mass frame);

- Some mathematical aspects (gradient, Stokes' theorem);

- More on angular momentum (fixed axis of rotation, motion combining translation and rotation);

- Rigid body motion (angular velocity and angular momentum as vectors, the gyroscope, precession);

- Gravity (historical background: from Brahe and Kepler to Newton and from Newton to Einstein, Newton's law of gravitation, inertial and gravitational mass, experimental tests, limits of validity, applications: elementary systems, astronomical and astrophysical systems);

- Central forces (two-body problem, reduced mass, general properties of central force motion);

- Non-inertial frames and fictitious forces (accelerating non-rotating frames, rotating coordinate systems, centrifugal and Coriolis forces, tidal forces, rotating bucket and Mach's principle, the equivalence principle and origins of General Relativity, Galilean transformations, principle of Relativity);

- Elements of fluid dynamics.

Further information at `http://www.maths.tcd.ie/~kovacs/Teaching/Mechanics/Classical_Mechanics.html`

July 19, 2010