Mechanics

Lecturer Details	Dr. Jamal Uddin *Office Hours*: Monday 3-4pm and Tues 11-11.30 in Room 229a	*Tel:* (0121) 414 6578 *E-mail:* J.Uddin@bham.ac.uk

Course Objectives

This module seeks to make the student familiar with Newton's Laws of Motion and other physical laws concerning, for example, friction, impacts and elasticity. We will use Newton's Laws of Motion to derive various consequences such as constant acceleration equations, the existence of the centre of mass and conservation of liner momentum. Set up and solve equations for problems in classical mechanics by resolving forces, use of moments, energy, momentum and impact. Solve multi-step modelling problems under classical assumptions, including problems related to equilibria, motion under constant acceleration, projectiles, relative velocity, circular motion, and simple variable acceleration (including simple harmonic motion).

Course Description

Classical or Newtonian mechanics is the foundation of applied mathematics and is an astonishingly powerful tool for explaining physical systems, from projectiles to planetary motion to the design of racing cars. It acts as a natural starting point for any serious discussion of mathematical modelling in broader areas. This module uses ideas such as forces, moments, Newton's Laws of Motion and energy to model practical situations. These models can then be analysed using a wide range of techniques from pure mathematics such as trigonometry, algebra, calculus and, in particular, vector methods. Real world problems are used to illustrate the theory and some surprising and counter-intuitive examples are discussed.

Delivery

22 hours of lectures (Mondays 5pm-6pm Howarth 101 and 6pm-7pm in Vaughan Jefferys). In addition the following contact hours will be shared with other modules: 11 hours of small group tutorials, 11 hours of seminars, up to 11 hours of computer labs.

Assessment

Assessment: 1.5 hour examination (80%), work done during semester (20%) Reassessment: best of 1.5 hour resit examination (100%) or 1.5 hour resit examination (80%) and work done during the semester (20%)

Syllabus

1. Vectors. 2. Forces and Circular Motion. 3. Projectiles. 4. Impulse and Momentum. 5. Dimensional Aanalysis. 6. Collisions 7. Oscillatory Motion 8. Variable Mass Problems.

Recommended Reading

There is no course book as such and we will be covering material found in almost any book with mechanics in its title.