3307 (Biomathematics)

Year:	2013–2014
Code:	MATH3307
Level:	Advanced
Value:	Half unit (= 7.5 ECTS credits)
Term:	1
Structure:	3 hour lectures per week
Assessment:	90% examination, 10% coursework
Normal Pre-requisites:	Some familiarity with basic mechanics and mathematical methods, eg 1301/2, 1401/2
Lecturer:	Prof A Zaikin

Course Description and Objectives

This course introduces students to biomechanics, an increasingly important branch of applied mathematics. It also serves to reinforce students' skills in mathematical modelling, a subject of importance for all students aiming to apply mathematics to other areas.

Detailed Syllabus

This course consists of mathematics, principally mechanics, applied to the understanding of the structure and functioning of animals. This course begins with the theory of scaling applied to classes of whole animals of similar shape. For example, we determine how high an animal can jump, how fast it can walk or run, how big a bird must be before it can fly, and so on. We go on to use similar arguments to study the mechanics of bones, muscles and other organs of the body in more detail. In this section, we briefly consider the fluid mechanics of the heart, in particular left ventricular ejection. Proceeding down in scale, we consider problems of microscopic dimensions, including diffusion through membranes.

The emphasis of the course will be on mathematical models, and no special knowledge of Biology is required or assumed.