Course staff
- The Course Authority is Dr. Adelle Coster.
- The course has two lecturers
  - Dr. Adelle Coster (Weeks 1-6)
    RC-2086, phone 9385-7048, email: a.coster@unsw.edu.au
  - Dr. Anna Cai (Weeks 7-12)
    RC-2083, phone 9385-7039, email: a.cai@unsw.edu.au
- Consultation is by appointment.

Course information
- 6 UOC
- Prerequisites: 12 units of credit in Level 2 Mathematics courses including: MATH2120 or MATH2130, OR both MATH2019 and MATH2089, OR both MATH2069 and MATH2099, Exclusions: MATH2280, MATH2281

Aims
This course gives an introduction to mathematical modelling and data analysis for biological and biomedical systems. Examples include: the formation of animal coat patterns, the spread of diseases through the community, the interaction between pathogens and the immune system of the body, the growth of tumours, nerve cell signalling, population dynamics, pharmacokinetics and bacterial growth. The emphasis in this course is on the development of the governing model equations and on computer simulations of the model equations rather than on mathematical methods for solving the model equations.

Relation to Other Mathematics Courses
Mathematics may be divided into the broad categories of analysis (calculus), algebra, geometry and logic.
This subject fits largely into the calculus category and follows on from material you will have learned in first year and from other related courses you may have taken, although algebra and areas will also be involved.
This course is very useful for those majoring in Applied Mathematics, those planning to teach, or those students of Mathematics who are interested in the application of mathematical techniques to real-world problem solving.

Relation to Graduate Attributes
The above outcomes are related to the development of the Science Faculty Graduate Attributes, in particular: 1. Research, inquiry and analytical thinking abilities, 4. Communication, 6. Information literacy

Teaching strategies underpinning the course
New ideas and skills are introduced and demonstrated in lectures, and then students develop these skills by applying them to specific tasks in tutorials and assessments.

Rationale for learning and teaching strategies
We believe that effective learning is best supported by a climate of enquiry, in which students are actively engaged in the learning process. To ensure effective learning, students should participate in class as outlined below.
We believe that effective learning is achieved when students attend all classes, have prepared effectively for classes by reading through previous lecture notes, in the case of lectures, and, in the case of tutorials, by having made a serious attempt at doing for themselves the tutorial problems prior to the tutorials.
Furthermore, lectures should be viewed by the student as an opportunity to learn, rather than just copy down lecture notes.
Effective learning is achieved when students have a genuine interest in the subject and make a serious effort to master the basic material.
The art of logically setting out mathematics is best learned by watching an expert and paying particular attention to detail. This skill is best learned by regularly attending classes.
• **Assessment**
  Assessment in this course will use problem-solving tasks of a similar form to those practiced in tutorials, to encourage the development of the core skills underpinning this course and the development of analytical thinking.

  In tests and exams, marks will be awarded for correct working and appropriate explanations and not just the final answer.

  o 3 class tests will be held in weeks 4, 6, and 11, worth 10% each.
    The Tests will give students feedback on their progress and mastery of the material.
    There will be short answer questions in which correct answers are sought and there will be some longer questions requiring clear and logical presentation of correct solutions as well as some verbal explanations.
    The test will be held in Lectures.
    You may bring your own non-programmable hand-held Scientific Calculator to the test. Calculators will not be provided for you. If you are absent from the test, you must provide a medical certificate. A further test may be offered at the discretion of the lecturer. Otherwise the medical certificate will be noted and your final mark will be calculated from the other assessment tasks.

  o Evaluation questions and in-session work, 10%. These include the submission at the end of week 6 of the tutorial problems nominated during the tutorials.

  o The final exam (2 hours) is worth 60%. The final examination will assess student mastery of the material covered in the lectures.

• **Outcomes**
  We believe that effective learning is best supported by a climate of inquiry, in which students are actively engaged in the learning process. Hence this course is structured with a strong emphasis on problem-solving tasks in lectures, in tutorials and in assessment tasks and students are expected to devote the majority of their class and study time to the solving of such tasks.

  New ideas and skills are first introduced and demonstrated in lectures, and then students develop these skills by applying them to specific tasks in tutorials and assessments. Computing skills are developed and practiced in regular computer practical sessions/web-based tutorials/attempting assessment tasks.

  This course has a major focus on research, inquiry and analytical thinking as well as information literacy. We will also explore capacity and motivation for intellectual development through the solution of both simple and complex mathematical models of biological systems, and the interpretation and communication of the results.

• **Course Evaluation and Development**
  The School of Mathematics & Statistics evaluates each course each time it is run. Feedback on the course is gathered, using among other means, UNSW’s Course and Teaching Evaluation and Improvement (CATEI) Process. Student feedback is taken seriously, and continual improvements are made to the course based in part on such feedback.
**Syllabus**
The course will include material from the following. Outline lecture notes for this course will be made available via the Blackboard web site, via http://telt.unsw.edu.au/
They are not a substitute for attendance at lectures and tutorials.
The course content is ultimately defined by the material covered in lectures.

- Population models
- Interacting populations
- Epidemics
- Compartmental Modelling & Pharmacokinetics
- Chemical Interactions
- Mathematical Models of Biological Diffusion
- Nerve Cell Signalling
- Turing Patterns and Animal Coat Patterns
- Tumour Growth Models

**Additional References**

**SCHOOL OF MATHEMATICS and STATISTICS, UNSW**
**IMPORTANT INFORMATION FOR UNDERGRADUATE STUDENTS**

**School Rules and Regulations**
Full details of the general rules regarding attendance, release of marks, special consideration etc are available via the School of Mathematics and Statistics Web page at http://www.maths.unsw.edu.au/currentstudents/assessment-policies

**Plagiarism and academic honesty**
Plagiarism is the presentation of the thoughts or work of another as one’s own. Issues you must be aware of regarding plagiarism and the university’s policies on academic honesty and plagiarism can be found at http://www.lc.unsw.edu.au/plagiarism and http://www.lc.unsw.edu.au/plagiarism/plagiarism_STUDENTBOOK.pdf.