MATH 3006 MATHEMATICAL MODELLING

Credit Points 10

Legacy Code 200022

Coordinator Stephen Weissenhofer (https://directory.westernsydney.edu.au/search/name/Stephen Weissenhofer/)

Description Mathematical Modelling is about solving real world problems. The real world is a complicated place which we often need or want to understand better. One way to do this is to set up a mathematical model which we hope can provide insights, predictions and a greater understanding of a complex system. Selected real-world problems are approximated by mathematical models that are amenable to being written in terms of linear and non-linear equations or differential equations. Once equations are solved emphasis is placed on interpreting solutions, modifying models as required and using models for prediction.

School Computer, Data & Math Sciences

Discipline Mathematics

Student Contribution Band HECS Band 1 10cp

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 3 subject

Pre-requisite(s) MATH 2003

Assumed Knowledge

Matrix algebra and how to find eigenvalues and eigenvectors.

Learning Outcomes

On successful completion of this subject, students should be able to:
1. formulate equations (both differential and non-differential) which describe selected common physical situations,
2. solve such equations analytically, where appropriate
3. apply computer packages to solve such equations
4. interpret the effects of altering parameters involved in a modelling situation
5. identify limitations of mathematical models proposed
6. evaluate the effectiveness of a model.

Subject Content

1. The modelling process
2. Modelling using proportionality and geometric similarity
3. Modelling discrete dynamical systems:
- modelling change with difference equations
- approximating change with difference equations
- solving difference equations
4. Modelling continuous dynamical systems:
- first and second order ordinary differential equations
- higher order linear ordinary differential equations
- systems of ordinary differential equations - nonlinear ordinary differential equations
5. Applications will be drawn from areas of biology, chemistry, physics, social sciences and economics.

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task
Intra-session Exam	50 minutes	20	N	Individual
Intra-session Exam	50 minutes	20	N	Individual
Final Exam	3 hours	60	N	Individual

Prescribed Texts

- Giordano, F. R., Fox, W. P., & Horton, S. (2014). A first course in mathematical modeling (5th ed.). Boston, MA Brooks/Cole Thomson Learning.

Teaching Periods

Spring (2024)
Campbelltown
On-site
Subject Contact Stephen Weissenhofer (https://directory.westernsydney.edu.au/search/name/Stephen Weissenhofer/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH3006_24-SPR_CA_1#subjects)

Penrith (Kingswood)
On-site
Subject Contact Stephen Weissenhofer (https://directory.westernsydney.edu.au/search/name/Stephen Weissenhofer/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH3006_24-SPR_KW_1#subjects)

Parramatta - Victoria Rd
On-site
Subject Contact Stephen Weissenhofer (https://directory.westernsydney.edu.au/search/name/Stephen Weissenhofer/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH3006_24-SPR_PS_1#subjects)