UNSW Course Outline

ZPEM2311 Mathematical Modelling - 2024

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General Course Information

Course Code : ZPEM2311
Year : 2024
Term : Semester 2
Teaching Period : Z2
Is a multi-term course? : No
Faculty : UNSW Canberra
Academic Unit : UC Science
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : UNSW Canberra at ADFA
Campus : UNSW Canberra
Study Level : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

This course extends the Linear Algebra and Calculus covered in first year. It is designed to give the student the ability to model familiar physical phenomena using differential equations. In particular the student will understand the difference between linear and nonlinear systems and

be able to solve and analyse general linear first-order ordinary differential equations, and ordinary second-order equations characterised by constant coefficients. Applications include changing populations, oscillations of a pendulum, and vibrations of a string.

Course Aims

The aim of this course is to combine the study of first- and second-order differential equations with the concepts of linearity and linear superposition to develop mathematical models in such areas as mechanics, population growth and harvesting, chemical reactions, sound, diffusion and wave motion.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : be able to solve and analyse general linear first-order ordinary differential equations, and ordinary second-order equations characterised by constant coefficients.
CLO2 : be able to solve a model numerically.
CLO3 : be able to construct a model of a physical system.
CLO4 : be able to analyse, and critically evaluate the solution of a model.

Course Learning Outcomes	Assessment Item
CLO1 : be able to solve and analyse general linear first-order ordinary differential equations, and ordinary second-order equations characterised by constant coefficients.	• Final Exam • Quizzes • Class Test
CLO2 : be able to solve a model numerically.	• Project • Class Test
CLO3 : be able to construct a model of a physical system.	• Final Exam • Project • Class Test
CLO4 : be able to analyse, and critically evaluate the solution of a model.	• Final Exam • Project

Learning and Teaching Technologies

Moodle - Learning Management System

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Final Exam	30%	
Quizzes	20%	
Project	30%	
Class Test	20%	

Assessment Details

Final Exam

Assessment Overview

Comprehensive exam.

Course Learning Outcomes

- CLO1 : be able to solve and analyse general linear first-order ordinary differential equations, and ordinary second-order equations characterised by constant coefficients.
- CLO3 : be able to construct a model of a physical system.
- CLO4 : be able to analyse, and critically evaluate the solution of a model.

Quizzes

Assessment Overview

Short weekly in-class quizzes or assignments with problems chosen from the weekly problem sets. Designed to keep students up-to-date with their work. Feedback provided next class.

Course Learning Outcomes

- CLO1 : be able to solve and analyse general linear first-order ordinary differential equations, and ordinary second-order equations characterised by constant coefficients.

Project

Assessment Overview

A project involving designing a mathematical model of a physical system. Includes 3 components: a project proposal due in week 4 (comments provided on a draft copy in week 3; development of code of the model with validation and running experiments; and a final report due in week 12.

Course Learning Outcomes

- CLO2 : be able to solve a model numerically.
- CLO3 : be able to construct a model of a physical system.
- CLO4 : be able to analyse, and critically evaluate the solution of a model.

Class Test

Assessment Overview

Mid-semester test in Week 7.

Course Learning Outcomes

- CLO1 : be able to solve and analyse general linear first-order ordinary differential equations, and ordinary second-order equations characterised by constant coefficients.
- CLO2 : be able to solve a model numerically.
- CLO3 : be able to construct a model of a physical system.

General Assessment Information

USE OF GENERATIVE AI: NO ASSISTANCE It is prohibited to use any software or service to search for or generate information or answers. If its use is detected, it will be regarded as serious academic misconduct and subject to the standard penalties, which may include 00FL, suspension and exclusion.

Grading Basis

Standard

Requirements to pass course

>50%

Course Schedule

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Duncan Sutherland					No	Yes
	Aleksander Simonic					No	No