MATH0065 (Advanced Modelling Mathematical Techniques)

Year: 2019–2020  
Code: MATH0065  
Old code: MATHMM01/MATHGM01  
Level: 7(UG)/7(PG)  
Normal student group(s): UG Year 4 Mathematics degrees  
                        PG MSc Mathematical Modelling  
Value: 15 credits (= 7.5 ECTS credits)  
Term: 1  
Structure: 3 hour lectures per week  
Assessment: 100% examination  
Normal UG Pre-requisites: MATH0010 (previously MATH1401)  
                        MATH0011 (previously MATH1402)  
                        MATH0013 (previously MATH2101)  
                        Some knowledge of 2D fluid mechanics useful, but not essential.  
Lecturers: Dr S Timoshin and Prof G Esler

Course Description and Objectives

This module aims to ensure that students possess knowledge of the analytical techniques used in mathematical modelling.

Recommended Texts


Detailed Syllabus

- Partial differential equations (PDEs): Revision of main solution techniques for elliptic and parabolic PDEs (separation of variables, Fourier transforms, similarity variables, Greens functions).

– Perturbation Methods. Introduction to modelling concepts, dimensional analysis, perturbation techniques, matched asymptotics.

– Application of Complex Variables. Conformal mapping and applications. A selection from:
  (a) Hodograph and potential-plane techniques
  (b) Schwartz functions and vortex equilibria
  (c) Hele-Shaw free boundary problems
  (d) Two-dimensional freezing/melting problems