Elements of Mathematical Modelling

Department responsible: Mathematics and Applied Mathematics

Status: Compulsory

Member of staff responsible: Prof Michael Taroudakis

Lecture hours: 42 (13*4)

ECTS: 10

Coursework: Two projects

Syllabus:

- Ordinary Differential Equations (ODE)
    - Solution methods for selected types of ODEs
    - Sample problems modelled by ODEs
- Partial Differential Equations (PDE)
    - Solution methods for selected types of PDEs
    - Sample problems modelled by PDEs
- Solving systems of linear equations
    - Gauss elimination
    - Matrix analysis
    - Eigenvalues and Eigenvectors of Matrices
- Fourier Transformations

Assessment method: 3 hr written examination at the end of semester (weight 70 %) and two projects during the semester (weight 30 %).

Learning outcome : The students will obtain skills to model typical problems arising from the physical sciences, using differential equations and assigning appropriate boundary conditions. They will be able to understand the importance of validating the deterministic models by ensuring the uniqueness and stability of the solution. Also they will learn how to apply special techniques, such as transformations, to bring the problems in a domain amenable to an easier solving process.