PH4045 – Data Processing for biomedical imaging and sensing

Credits: 15  
Number of Lectures: Available: 2018-19  
Semester: 2  
Lecturer: Dr Michael Mazilu and Dr Paul Cruickshank

Overview

Medical imaging and sensing technology plays a major role in the way people are diagnosed and treated in hospitals. The physics involved in these imaging techniques and the data analysis need to enable the visualisation of relevant information is the subject of this module.

Aims & Objectives

Exploring these technologies, the underlying physics and the data analysis behind them enhances their current use and allows for insight into their potential future development. The objective is to numerically simulate, visualise and gain insight into a variety of medical imaging and sensing techniques.

Learning Outcomes

The module teaches the physics and data treatment involved in different medical imaging modalities. The students will be able to implement numerical methods necessary to simulate and/or treat data related to medical imaging and sensing.

Synopsis

This module will cover: the different types of medical imaging (such as MRI, CT, PET, ultrasound and optical imaging), the fundamental principles and physics behind these techniques, their uses and limitations in a clinical setting, and applicable data treatment and signal processing techniques, including how to program these.

The module contact time is composed of 2 afternoon sessions per week of 2.5 hours each. Each session consists of a lecture type input introducing the subject followed by a guided programming and application part of the session.

Prerequisites

PH3080 or PH3082

Anti-requisites

None

Assessment

2-hour written examination 60%, coursework 40%

Additional information on continuous assessment etc.

The continuous assessment part of this module includes a project. This project is split into two parts. In an initial part, the student is asked to read about the subject, develop an understanding of the technique in questions and to numerically implement this technique. All background material is provided at the start of the project. There is a milestone mid-project submission, which will ensure that the approach and technique is sound. In the second part of the project the students will use the code and understanding developed to finish the project with a short study and write up a report. The
viva will consist of 10 minutes presentation by the student of the project followed by questions probing the results presents and understanding gained (physics, coding and data treatment).

**Recommended Books**

Please view University online record: http://resourcelists.st-andrews.ac.uk/modules/ph4045.html

**General information**

Please also read the general information in the School's honours handbook.