

## **Engineering Tripos Part IIB, 4M21: Software Engineering and Design, 2021-22**

### **Module Leader**

[Dr E Punskeya](#) [1]

### **Lecturer**

Dr E Punskeya

### **Timing and Structure**

Lent term. 16 lectures (including integrated examples classes). Assessment: 100% exam.

### **Objectives**

As specific objectives, by the end of the course students should be able to:

- Understand the benefits of object-oriented analysis and design, its concepts and processes.
- Be familiar with formal design tools for object orientated design and analysis.
- Recognise and understand some frequently used design patterns.
- Be aware of the process involved in user interface design.
- Understand software development methodologies.
- Understand the main issues and processes necessary to achieve effective software product development.
- Be familiar with main challenges of software innovation and the strategies and opportunities to address them

### **Content**

Software forms an important part of many modern engineering products, from telecommunications to automotive to internet-based systems. This course will provide an understanding of the technical and management processes involved in the design of software systems. Software engineering concepts are considered at a range of scales, from the manipulation of object-orientated concepts, through architectural design components, to the building of large complex software systems.

#### **Software Design**

- Concepts Behind Software Design: managing complexity of the software systems and ?minimizing risks.
- Object-Oriented Software Design Principles: abstraction, problem partitioning, how ?to identify components.
- Object-Oriented, Design and Analysis: classes and objects, ?encapsulation and data hiding, abstraction and inheritance, polymorphism.
- Formal Tools: introduction to UML.
- Design Patterns: frequently occurring design techniques and their role in building ?systems.
- Principles of Good Design and User Interface Design: designing experiences, ?designing for the user, use cases, process and main elements, usability. ?

#### **Software Systems and Engineering**

- Quality Assurance and Risk Management: testing, automated testing, tools.
- Software Development Methodologies: from waterfall to agile programming.

- Software Management: project lifecycle, source code control, code reviews, testing, the nightly build, release management, maintenance and refactoring, organising software teams.
- Software Innovation and Entrepreneurship.

### Booklists

Please refer to the Booklist for Part IIB Courses for references to this module, this can be found on the associated Moodle course.

### Examination Guidelines

Please refer to [Form & conduct of the examinations](#) [2].

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