

## **Engineering Tripos Part IIB, 4M21: Software Engineering and Design, 2022-23**

### **Module Leader**

[Dr E Punskeya](#) [1]

### **Lecturer**

Dr E Punskeya

### **Lecturer**

Professor Per Ola Kristensson

### **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 main issues and processes necessary to achieve effective software product development.
- 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.
- Understand software development methodologies.
- Be aware of the principles and processes involved in user interface design.

### **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, including human-computer interaction. 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 Engineering and Design**

- Concepts behind software design: managing complexity of the software systems and ?minimizing risks.
- Object-orientated software design and analysis: ?encapsulation, abstraction, polymorphism and inheritance.
- Formal tools: introduction to UML.
- Design patterns: frequently occurring design techniques and their role in building ?systems.
- Software development methodologies: from waterfall to agile programming.
- Quality assurance and risk management: testing, automated testing, tools.
- Software management: project lifecycle, release management, organising ?software teams, software innovation.

#### **Human-Computer Interaction**

- Understanding people: perception, motor control, cognition, needs and motivations.
- User research: interviews, field research, survey research, unobtrusive research.
- Interaction: information and control, dialogue, artificial intelligence, tool use, practice.
- User interfaces: input devices, displays, interaction techniques, commands and navigation, graphical user interfaces, reality-based interaction.
- Design: design cognition, design processes, design practice.
- Engineering: engineering processes, systems, safety and risk, engineering methods.
- Evaluation: analytic methods, think-aloud studies, experiments.

### 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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