Engineering Tripos Part IIB, 4M21: Software Engineering and Design, 2023-24

Module Leader

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Lecturer

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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](https://teaching.eng.cam.ac.uk/content/form-conduct-examinations) [2].

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[1] mailto:op205@cam.ac.uk
[2] https://teaching.eng.cam.ac.uk/content/form-conduct-examinations