



E0 272 Jan 3:1

Formal Methods in Software Engineering

Instructor

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Department: Computer Science and Automation

Course Time: Mon, Wed, 9:30 - 11:00 am

Lecture venue: CSA 252

Detailed Course Page: www.csa.iisc.ac.in/~deepakd/fmse-2017

Announcements

Brief description of the course

Software is used for an increasing range of business and personal activities, and to control vital processes and tasks. This makes it important that software be developed efficiently, and the software be correct and reliable. However, software development and maintenance has largely remained mostly a human activity, with sub-optimal usage of tools and formal processes. This course will equip students with knowledge of the latest advances in the role of tools and formal methods in software engineering. The course will focus on all stages of software engineering, from requirements, design, coding, verification, and testing. The methodology will be to study a series of advanced tools that address challenges faced in these steps. This will include both an introduction to the theoretical underpinnings of these tools, as well as hands-on exploration in class as well as in assignments.

Prerequisites

None.

Syllabus

Conceptual modeling of requirements using logic (Tool: Alloy).

Algorithmic verification (model-checking) of design/models (Tool: Spin).

Verifying functional correctness: Abstract Data Types and refinement (Tool: Rodin), Hoare logic assertions, refinement of a program with respect to abstract ADT specification. (Tool: VCC)

White-box testing of applications (Tool: Pex).

Grey-box testing of applications (Tool: AFL)

Course outcomes

Students who complete the course will be proficient in the basic techniques and tools for carrying out formal verification of software systems.

Grading policy

60% for Assignments, 20% for midsem, 20% for endsem.

Assignments

There will be one assignment each on the theory and usage of the 5 tools in the course. Details of assignments will be available on the course page.

Resources

Lecture slides, online documentation of tools, papers.