Course Objectives: To apply advance topics in software engineering. To specify, abstract, verify and validate solutions to large-size problems, to plan, develop and manage large software using state-of-the-art methodologies and learn emerging trends in software engineering.

Formal Methods: Basic concepts, mathematical preliminaries, Applying mathematical notations for formal specification, formal specification languages, using Z to represent an example software component, the ten commandments of formal methods, formal methods- the road ahead.

Cleanroom Software Engineering: approach, functional specification, design and testing.

Component-Based Software Engineering: CBSE process, domain engineering, component-based development, classifying and retrieving components, and economics of CBSE.

Client/Server Software Engineering: Structure of client/server systems, software engineering for Client/Server systems, analysis modeling issues, design for Client/Server systems, testing issues.

Web Engineering: Attributes of web-based applications, the WebE process, a framework for WebE, formulating, analyzing web-based systems, design and testing for web-based applications, Management issues.

Reengineering: Business process reengineering, software reengineering, reverse reengineering, restructuring, forward reengineering, Economics of reengineering.


Mobile Development Process: Model View Controller, Presentation Abstraction Control, UML based development, Use cases, Testing: Mobile infrastructure, Validating use cases, Effect of dimensions of mobility on testing, Case study: IT company, Requirements, Detailed design, Implementation.
**Real Time Operating Systems:** Real-time and non-real time applications. Classification of Real-Time Task scheduling algorithms, Event-driven scheduler- Simple priority-based, Rate Monotonic Analysis, Earliest Deadline First, The simplest of Task assignment and scheduling, priority scheduling, characteristics of tasks, task assignment and multi-tasking.

**Software Engineering Issues in Embedded Systems:** Characteristics of embedded systems I/O, Embedded systems/real time systems. Embedded software architecture, control loop, interrupts control system, co-operating multitasking, pre-emptive multitasking, Domain analysis, Software element analysis, requirement analysis, Specification, Software architecture, Software analysis design, implementation, testing, validation, verification and debugging of embedded systems.

**Laboratory Work:** To implement the advance concepts in the lab using related tools and to develop the project using related technologies

**Recommended Books**