

## **Syllabus**

**Course Name: Software Engineering**

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### **Course Content:**

Introduction and overview of SE: Concepts about Software, SE activities, Issues of professional responsibility, key challenges facing SW engineering, Software Engineering methods Software Development Life Cycle (SDLC): Process Models – their advantages and disadvantages, Agile development, Requirement Phase: Elicitation, Analysis, Specification and Validation, Studying feasibility of requirements – operational, technical and economic, Requirements Prioritization. Design Phase: Differences between requirement analysis and design Activities, important desirable characteristics of a good software design, Coding and Testing: Coding standards and coding guidelines, code reviews and inspections, various types of testing Software Project Management: Software project monitoring and control, critical Path, PERT Chart, Gantt Chart Software Quality and Reliability: Software Quality control and Quality assurance, Reliability issues and metrics Software Maintenance: Necessity of software maintenance, the types of software maintenance, software reverse engineering.

### **Course Outcomes:**

**CO1:** Understand and apply the knowledge of software engineering practices to design the software solution for a particular problem.

**CO2:** Understand and analyze the concept of software quality, project management and maintenance of various software.

**CO3:** Implement and analyze the various project management and software testing methods.

### **Text Book:**

- 1) Ian Sommerville, “Software Engineering”, 9th edition, Pearson.
- 2) Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill, 8th edition

### **Reference Book:**

- 1) Waman S Jawadekar, “Software Engineering – Principles and Practices”, McGraw Hill Companies.
- 2) Richard Fairley, “Software Engineering Concepts”, McGraw Hill Education, Indian edition.
- 3) Pankaj Jalote, “Software Engineering”, Narosa Publications, 3rd edition

**Course Content:**

Introduction to various types of sensors: LDR, photo diodes, motion sensors, ultrasonic sensors, hall sensors, temperature, humidity sensors, etc. Sensor signal conditioning: Basics and types of signal conditioning e.g., Analog signal conditioning (amplification, level shifting, voltage to current and current to voltage conversion, filtering). Digital signal conditioning (noise removal, analog to digital conversion, isolation using opto-couplers). Introduction to microcontrollers boards ARDUINO NANO, ARDUINO, ESP8266, NODE MCU, ESP32, RASPBERRY PI, NVIDIA JETSON, etc. Architecture, pin diagram and features of ATmega328 microcontroller. I/O programming, Timers, watch-dog timer basics, and programming. Analog to digital convertor basics and programming in C interfacing temperature, LDR, etc. Interrupt programming in C. Serial communication basics and programming in C e.g., UART, I2C, and SPI. Sensors and Actuators interfacing e.g., led, push button, debouncing of switch its hardware and software solution, dc, servo, stepper, and BLDC motor driver design basics and programming. PWM basics and programming in C e.g., fast, phase correct PWM etc. Analog comparator programming in C. Creating header files.

**Course Outcomes:**

**CO1:** Understand the fundamentals of sensors and its signal conditioning basics.

**CO2:** Understand various types of microcontroller development boards and uses in various applications.

**CO3:** Understand and analyze the basics of ATMEGA 328 microcontroller and do its programming basics which includes I/O, timer, interrupt, analog to digital, communication, PWM programming.

**Text Book:**

- 1) Muhammad Ali Mazidi., “AVR microcontroller and Embedded systems using assembly and C”,
- 2) “Richard H., “Embedded C programing and the ATMEL AVR”, Thompson Delmar learning.

**Reference Book:**

- 1) The Intel ATmega 328 datasheet.

**Course Content:**

Defining Cloud Computing, Cloud Types: The NIST model, The Cloud Cube Model, Examining the Characteristics of Cloud Computing, Benefits of cloud computing, Disadvantages of cloud computing. Understanding cloud architecture- Exploring the Cloud Computing Stack, Composability, Infrastructure Platforms, Virtual Appliances, Communication Protocols Applications, Connecting to the Cloud. Hardware and Infrastructure- Clients, Security, Network, Services. Software as a Service (SaaS)- Defining Software as a Service (SaaS), SaaS characteristics, Open SaaS and SOA, Salesforce.com and CRM SaaS. Platform as a Service (PaaS)- Exploring PaaS, variations in PaaS delivery models, and understanding the benefits of PaaS. Infrastructure as a Service (IaaS)- Defining Infrastructure as a Service ,IaaS Workloads. Identity as a Service (IDaaS)- What is an identity? Networked identity service classes, Identity system codes of conduct, IDaaS interoperability. Capacity Planning-Defining Baseline and Metrics Baseline measurements, System metrics, Load testing, Resource ceilings, Server and instance types, Network Capacity, Scaling Understanding Cloud Security- Securing the Cloud The security boundary, Security service boundary Security mapping, and Securing Data. Moving Applications to the Cloud- Applications in the Clouds, Functionality mapping, Application attributes, Cloud service attributes, System abstraction, Cloud bursting, Applications and Cloud APIs. Working with Cloud Based Storage-Measuring the Digital Universe, Cloud storage in the Digital Universe, Cloud storage definition, Provisioning Cloud Storage, Unmanaged cloud storage, Managed cloud storage, Creating cloud storage systems, Virtual storage containers. Communicating with the Cloud-Exploring Instant Messaging, Instant messaging clients, and Instant messaging interoperability, Micro-blogs or Short Message Services, Exploring Collaboration Technologies, Using Social Networks Features. Using the Mobile Working with Mobile Devices, Defining the Mobile Market, Connecting to the cloud, Adopting mobile cloud applications Feature phones and the cloud, Using Smartphones with the Cloud. Managing cloud workloads and services Understanding workloads, looking at principle of workload management, connecting workloads in the cloud. Migrating to the Cloud-Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, and Migration. Working with Mobile Web Services Understanding Service Types, Mobile interoperability, Performing Service Discovery Context-aware services.

**Course Outcomes:**

- CO1:** Understand and apply the knowledge of Cloud Computing, its infrastructure, and applications.
- CO2:** Design and development the Capacity Planning, security solution for the cloud system.
- CO3:** Understand and implement the concept of Cloud storage, Mobile Cloud, and various workstations and migration in cloud.

**Text Book:**

- 1) Cloud Computing Bible by Barrie Sosinsky, Published by Wiley Publishing, 2011.

**Reference Book:**

- 1) Cloud Computing: A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, 2010 by The McGraw-Hill.
- 2) Cloud Computing for Dummies by Judith Hurwitz, Robin Bloor, Marcia Kaufman, and Dr. Fern Halper, Wiley Publishing, 2012.