Department of Computer Science and Engineering
National Institute of Technology Jamshedpur

Autumn Semester 2020 – 21
Course Handout

Class – 5th Semester B. Tech. (Computer Sc. & Engg.)

Course Code – CS1504 **Course – Software Engineering**
Lecture: Monday, Tuesday & Wednesday (P3, 12.00–1.00pm) **Faculty – Dr. B. K. Singh**

Course Objective:
To introduce the concepts of software engineering for software development, design and implementation.

Prerequisite
- Students must have the knowledge of basic concepts of Data Structures and Operating Systems.

Course Material
- Lecture notes discussed in the classes
- Notes/Papers (circulated in the class)

- **Recommended Textbooks**
  - Rajib Mall, Fundamentals of Software Engineering, Prentice Hall India .
  - Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House.

- **Reference Books**
  - Pressman, R. S. and Lowe, D., "Software Engineering: A Practitioner's Approach", Tata McGraw-Hill.
  - M K Lal, "Knowledge Driven Development, Cambridge Press
  - Sommerville, I., "Software Engineering", 9th Ed., Pearson.

Evaluation Scheme

Mid Sem exam	30%
Assignments / Quiz / Performance / Attendance	30%
End Sem Exam	40%

Attendance policy: Institute attendance rules will be followed strictly.

Details of Course

Sl. No.	Contents	Contact Hours
1.	Introduction to Software and Software Engineering – Software Crisis, Software classification, Evolution of software engineering methodologies, Software engineering challenges, Software engineering principles.	3
2.	Software Processes – Software process model, Elements of software process, Characteristics of software process, Process classification, Software development process models.	3

3.	Software Project Management – Project management essentials, project management team, Project life cycle, Project management process, Software configuration management, Risk management.	4
4.	Project Planning and Estimation – Project planning activities, Software metrics and measurements, Project size estimation, Effort and cost estimation techniques/models, Staffing and Personnel planning, Project scheduling and milestones.	4
5.	Software requirement analysis and specifications – Software requirements applicability to small, medium, and large-scale systems, Requirements analysis, Structured analysis, Data-oriented analysis, Object- oriented analysis, Prototyping analysis, Requirement specification, Formal requirements specification and verification, Requirements validation, Requirements management.	6
6.	Software Design – Software design process, design principles, technical design, objectives of design, design metrics, modularity, module coupling and cohesion, relation between cohesion and coupling; Design strategies: Bottom up design, top down design, hybrid design, function oriented design, Design verification.	6
7.	Object-Oriented Design using UML – Object oriented analysis and design, Unified Modeling Language (UML), UML building blocks, UML diagrams, Object oriented analysis and design process.	4
8.	Coding – Coding principles, Coding styles, coding errors, coding process, Code verification, Code documentation.	3
9.	Software Testing – Testing fundamentals, Test planning, Black-box testing and White-box testing, Levels of testing – Unit testing, Integration testing, System testing and Acceptance testing, Regression testing, Debugging approaches.	4
10.	Software Quality and Reliability – Software quality concepts, Verification and Validation, The cost of Quality, Software Quality Assurance, Best practices of software engineering, Software Reliability metrics, Reliability growth models.	3
11.	Software Maintenance, Software Reuse and CASE tools.	2
	Total	**42**