# GANPAT UNIVERSITY

## FACULTY OF COMPUTER APPLICATIONS

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|---|---|---|---|
| **Programme** | Master of Computer Applications | **Branch/Spec.** | Computer Application |
| **Semester** | II | **Version** | 1.0.0.2 |
| **Effective from Academic Year** | 2022-23 | **Effective for the batch Admitted in** | June 2022 |
| **Subject Code** | P12A3SE | **Subject Name** | Software Engineering |

| **Teaching scheme** | | | | | | **Examination scheme (Marks)** | | | |
|---|---|---|---|---|---|---|---|---|---|
| **(Per week)** | **Lecture (DT)** | | **Practical (Lab.)** | | **Total** | | **CE** | **SEE** | **Total** |
| | L | TU | P | TW | | | | | |
| Credit | 2 | 0 | 1 | 0 | 3 | Theory | 40 | 60 | 100 |
| Hours | 2 | 0 | 2 | 0 | 4 | Practical | 20 | 30 | 50 |

**Objective:**

- To understand essential concepts of requirements engineering and analysis modeling.
- To understand the various phases of a software project.
- To learn various process models and metrics, software project risk analysis and management.
- To learn UML software modeling, basic, advanced and behaviors modeling.

**Pre-requisites:**

- Student must have knowledge of Software Development Process and Object Oriented Concepts.

**Course Outcomes :**

- **1 = Slight (Low); 2 = Moderate (Medium); 3 = Substantial (High); "-" = No Correlation**

| Name of CO | Description |
|---|---|
| CO1 | Understand the software engineering concepts and compare software process models for solving defined problems. |
| CO2 | Apply software metrics and analyze project risks to support effective project planning and management. |
| CO3 | Construct UML structural models using classes, attributes, operations, and relationships for a given system. |
| CO4 | Develop advanced UML structural and behavioral diagrams to model complete system interactions and workflows. |

| **Mapping of CO and PO** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 3 | 2 | 2 | 1 | 3 | 1 | 1 |
| CO3 | 2 | 2 | 3 | 3 | 1 | 1 | 1 | 1 |
| CO4 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 2 |

**Content:**

| Unit | SECTION – I | Hrs |
|---|---|---|
| 1 | **Introduction to Software Engineering:** Defining software, characteristics of software, attributes of a good software, software product, software development life cycle, applications of software, software engineering practices, software myths.<br>**Process Models:** Generic process model (defining framework activity, identifying task set), process assessment & improvement, the Waterfall Model, Incremental Process Models: The Incremental Model, The RAD Model, Evolutionary Software Process Models: Prototyping, The Spiral Model, Concurrent Development Model, Specialized Process Models: Component-Based Development, Aspect oriented Software Development. | 10 |
| 2 | **Metrics for Process and Projects:** Software process and project metrics, Software measurement: Size Oriented Metrics, Function Oriented Metrics. **Risk analysis and Management:** Management activities, project planning, project scheduling, risk analysis and management, Reactive versus proactive risk strategies, Software risks, Risk identification, Risk projection, Risk refinement, Risk mitigation, monitoring, and management | 6 |
| | **SECTION – II** | |
| 3 | **Introduction to UML:** Overview of UML, Conceptual Model of UML, Common Mechanisms in the UML, Architecture, Software Development Life Cycle, UML modelling with example.<br>**Basic Structural modeling** : Classes: Names, Attributes, Operations, Organizing Attributes and Operations, Responsibilities Advanced Classes: Classifiers, Visibility, Scope, Abstract Root Leaf and Polymorphic Elements, Multiplicity, Attributes, Operations, Relationships: Dependency, Generalization, Association Advanced Relationships: Dependency, Generalization, Association, Realizations. | 6 |
| 4 | **Advanced Structural modeling:** Class Diagrams: Common Uses, Common modelling Techniques, Interface Types and Roles: Operations, Relationships, Understanding an Interface, Types and Roles, Packages: Names, Owned Elements, Visibility, Importing and Exporting, Generalization, and Standard Elements.<br>**Behavioural modelling Interactions:** Object and Roles, Links and connectors, Use Case Diagrams, Interaction Diagram: Sequence Diagram, Collaboration Diagram. Activity Diagram: Action and Activity States, Transactions, Branching, Forking and Joining, Swim lanes Diagram. | 10 |

**Practical Content:**

Laboratory work will be based on the above syllabus with minimum 15 experiments to be incorporated which will be considered for evaluation purpose.

**Text Books:**

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| 1 | Roger S. Pressman, "Software Engineering – A Practitioner"s Approach", Mc Graw-Hill International Edition 7th Edition 2012. |
| 2 | The Unified Modeling Language User Guide by Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson 1st Edition 1998. |

**Reference Books:**

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|---|---|
| 1 | Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011. |
| 2 | Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010. |
| 3 | Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited, 2009. |

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|---|---|
| 4 | Stephen R.Schach, “Object Oriented and Classical Software Engineering”,8th Edition Tata McGraw-Hill Publishing Company Limited, 2007. |
| **MOOC/Certification Courses:** | |
| 1 | https://www.edx.org/course/software-engineering-essentials |
| 2 | https://www.my-mooc.com/en/mooc/software-engineering-introduction/ |
| 3 | https://www.classcentral.com/course/swayam-software-engineering-14293 |
| 4 | https://onlinecourses.nptel.ac.in/noc21_cs65/preview |
| 5 | https://www.coursera.org/specializations/software-design-architecture |
| 6 | https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=7 |

**Question Paper Scheme:**

**University Examination Duration: 3 Hours**

Note for Examiner: -

(I) Questions 1 and 4 are compulsory with no options.

(II) Internal options should be given in questions 2, 3, 5 and 6.

**SECTION – I**

Q.1 –8 Marks

Q.2 –11 Marks

Q.3 –11 Marks

**SECTION - II**

Q.4 –8 Marks

Q.5 –11 Marks

Q.6 –11 Marks