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**UNIVERSITY OF PETROLEUM & ENERGY STUDIES**

**College of Engineering Studies**

**Dehradun**

**COURSE PLAN**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Programme | : | B.Tech(CSE) All Branches | | | |
| Course | : | Software Engineering & Project Management | | | |
| Subject Code | : | CSEG 265 | | | |
| No. of credits | : | 3 |  |  |  |
| Semester | : | IV | | | |
| Session | : | Jan 2017- May 2017 | | | |
| Batch | : | 2014-2018 |  |  |  |
| Prepared by | : | Ravi Prakash | | | |
| Email | : | [rprakash@ddn.upes.ac.in](mailto:rprakash@ddn.upes.ac.in) | | | |

**Approved By**

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Faculty Name HOD

UPES Campus Tel: +91-135-2770137

“Energy Acres” Fax: +91 135- 27760904

P.O. Bidholi, Via Prem Nagar, Dehradun Website : [www.upes.ac.in](http://www.upes.ac.in)

**COURSE PLAN**

1. **PREREQUISITE:**
   1. Basic Knowledge of Data Structure & Algorithms.
   2. Basic Knowledge of Programming Language.

1. **OBJECTIVES OF COURSE:-**
2. To understand the concepts of Software Engineering and its processes.
3. To understand Software requirement Analysis and specification.
4. To understand planning a software project on the basis of Cost, Schedule and Quality
5. To gain in-depth knowledge of the testing techniques and strategies deployed
6. **PROGRAM OUTCOMES (POs) FOR IT INFRASTRUCTURE:**

After completion of the program the students will be able to:

PO1: Apply knowledge of mathematics and Sciences in Computer Engineering and Information Technology.

PO2: Understand the impact of Computer Science and Engineering and Information Technology over global economics, environment and social structure to cater the needs of the society.

PO3: Understand the importance of team work with professional and ethical responsibilities.

PO4: Communicate effectively in various forms useful during all professional activities.

PO5: Implement, and evaluate computer-based systems, processes, components, or programs to meet the desired goal of the business/research domains.

PO6:  Develop software by analyzing a problem to identify and define its computational requirements.

PO7:  Acquire new technologies for individual and professional development.

PO8: Use current techniques, skills, and tools necessary for computing practices and to solve Engineering problems for the furtherance of the various application domains.

PO9: Apply design and development principles in the development of software systems of varying complexity.

PO10: An ability to design a system, component, business processes for Enterprise development

PO11: An ability identify optimized business solution with help of computational techniques

PO12: An ability to understand the recent development in business model using technology and standard

1. **COURSE OUTCOMES For Software Engineering & Project Management: At the end of this course student should be able to :**

CO1. Identify, formulate, and solve engineering problems.

CO2. Understand various software process models such as the waterfall and evolutionary models.

CO3. Analyze, design, verify, validate, implement, apply, and maintain software systems.

CO4. Demonstrate effective teamwork and strong working knowledge of ethics and professional responsibility.

CO5. Manage the selection and initiation of individual projects.

CO6. Demonstrate effective project execution, quality control and risk management techniques that result in successful projects.

CO7. Conduct project planning activities that accurately forecast project costs, timelines and quality.

CO8. Conduct standard tests and measurements; to conduct, analyze, and interpret results; and to apply results to improve processes.

**Table: Correlation of POs v/s COs**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  |  |  |  |  | 2 |  | 3 |  |  |  |  |
| CO2 |  |  |  |  |  |  |  |  | 2 |  |  |  |
| CO3 |  |  |  |  |  | 2 |  |  | 2 |  | 1 |  |
| CO4 |  |  | 3 |  |  |  |  |  |  |  |  |  |
| CO5 |  |  |  |  |  |  |  | 1 | 1 |  |  |  |
| CO6 |  |  |  |  |  |  |  | 2 |  |  |  |  |
| CO7 |  |  |  |  | 1 |  |  | 1 |  |  | 1 |  |
| CO8 |  |  |  |  | 2 |  |  |  |  |  |  |  |

1. WEAK 2. MODERATE 3. STRONG
2. **COURSE OUTLINE**

**UNIT- 1: Introduction to Software Engineering**

**UNIT- 2: Requirement Analysis and Specifications**

**UNIT- 3: Software Project Planning**

**UNIT -4: Software Metrics**

**UNIT- 5: Software Testing**

**UNIT-6: Project Quality and Risk Management**

**UNIT-7: Project Integration and Scope Management**

1. **PEDAGOGY**
2. Class Test
3. Quiz
4. Assignments
5. Digital and analog Presentations
6. Concept diary (needs to be maintained by students-short and concise notes which include course concepts that he/she has understood.)
7. **COURSE COMPLETION PLAN**

|  |  |
| --- | --- |
| **Total Class room sessions** | 36 |
| **Total Quiz/ Test** | 03 |
| **Total Assignment** | 02 |

One Session =60 minutes

1. **EVALUATION & GRADING**

Students will be evaluated based on the following 3 stages.

* 1. Internal Assessment - 30%

5.2 Mid-term Examination - 20%

* 1. End term Examination - 50%

**H1. INTERNAL ASSESSMENT: WEIGHTAGE – 30%**

Internal Assessment shall be done based on the following:

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Description** | **% of Weightage** |
| 1 | Individual Assignments & Problems/Presentations | 30% |
| 2 | Class Tests/ Quiz | 50% |
| 3 | General Discipline, Faculty Assessment, Attendance | 20% |

**H2. Internal Assessment Record Sheet (including Mid Term Examination marks)** *will be displayed online at the end of semester i.e. last week of regular classroom teaching.*

**H3. CLASS TESTS/QUIZZES:** One Class Test based on descriptive type theoretical & numerical questions will be held before the Mid Term Examination; and either quiz based on objective types questions or a class test to be held before the End Term Examination. Those who do not appear in Class test and quiz examinations shall lose their marks.

*The marks obtained by the students will be displayed on LMS a week before the start of Mid Term and End Term Examinations respectively.*

**H4. ASSIGNMENTS:** There will be home assignments based on theory and numerical problems one before the Mid Term Examination and one before the End Term Examination. Those who fail to submit the assignments by the due date shall lose their marks.

**H5. GENERAL DISCIPLINE:** Based on student’s regularity, punctuality, sincerity and behavior in the class.

*The marks obtained by the students will be displayed on LMS at the end of semester.*

**H6. MID TERM EXAMINATION: WEIGHTAGE – 20%**

Mid Term examination shall be Two Hours duration and shall be a combination ofShort and Long theory Questions.

***Date of showing Mid Term Examination Answer Sheets: Within a week after completion of mid Sem examination.***

**H7. END TERM EXAMINATION: WEIGHTAGE – 50%**

End Term Examination shall be Three Hours duration and shall be a combination of Short and Long theory/numerical Questions.

**H8. GRADING:**

The overall marks obtained at the end of the semester comprising all the above three mentioned shall be converted to a grade.

1. **DETAILED SESSION PLAN**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SESS-ION** | **TOPIC** | **Course Outcomes Addressed** | **Required Learning Resources**  **(including media)** | **Discussion(s) and  Postings on Frontier** | **Assignment/ Quizzes/ Tests** |
|  | **UNIT 1 : Introduction to Software Engineering** | **CO 1**  **CO 2**  **CO 3** | **Books:**  1. *Aggarwal, K. K. & Singh, Yogesh (2008). Software Engineering. New Age International Publishers*.  Note: Learning resources have been written for first few lectures only. For remaining lectures the same may be added accordingly. |  |  |
| **L1** | Software Engineering definition; S/W characteristics, applications |  |
| **L2** | Life Cycle Models – Waterfall (classical and iterative) |  |
| **L3** | Spiral Model with quadrants and its scope |  |
| **L4** | Prototyping, RAD Models |  |
| **L5** | Comparison of above models and their applications |  |
|  | **UNIT 2 : Requirements Analysis and Specifications** | **CO 7**  **CO 3** | 1. *Aggarwal, K. K. & Singh, Yogesh (2008). Software Engineering. New Age International Publishers*. |  |  |
| **L6** | Requirements Engineering-Crucial steps; types of requirements |
| **L7** | Requirements documentation – Nature of SRS, characteristics of a good SRS |
| **L8** | Use case approach with guidelines | Assignment – 1 |
| **L9** | Problems on Use Case diagram |
| **L10** | DFD (Level 0, 1, 2 and 3) |
| **L11** | Organization of the SRS |  |
|  | **UNIT 3: Software Project Planning** | **CO 7**  **CO 3** | 1. *Aggarwal, K. K. & Singh, Yogesh (2008). Software Engineering. New Age International Publishers*. |  |  |
| **L12** | Size Estimation – LOC and Function Count, Albrecht FPA |  |
| **L13** | Cost estimation– Static, Single variable and Multivariable Models (SEL, Watson Felix model) |  |
| **L14** | The Constructive Cost model: basic, intermediate model |  |
| **L15** | Cost-benefit evaluation techniques (Net Profit, Payback period, ROI, NPV computation) |
| **L16** | Problems(numerical) on above methods |  |
|  |  |  |
|  | **UNIT 4 : Software Metrics** |  |
| **L17** | Understanding metrics: definition, process metrics, product and project metrics, areas of applications |  |
| **L18** | Product metrics – Metrics for source code; metrics for testing(Halstead metrics); |  |
| **L19** | Numericals based on above metrices |  |
| **L20** | Metrics for maintenance and numericals |  |
|  | **UNIT 5: Software Testing** | **CO 7**  **CO 3** | 1. *Aggarwal, K. K. & Singh, Yogesh (2008). Software Engineering. New Age International Publishers*. |  |  |
| **L21** | Understanding software testing, its need and objectives; Error, mistake, bug, fault and failure |
| **L22** | Test, test case and test suite; Verification & Validation; Alpha, Beta and Acceptance Testing |  |
| **L23** | Functional (BBT) Testing –characteristics, pros & cons |  |
| **L24** | Boundary Value Analysis with numerical problems |  |
| **L25** | Equivalence Class testing with numerical problems |
| **L26** | Structural Testing (WBT) – concept; characteristics, its pros and cons; Comparison with BBT |
| **L27** | Path Testing(Flow graph) with problems |
| **L28** | Cyclomatic complexity with numericals |
|  | **UNIT 6 : Project Quality and Risk Management** |  |  |  |  |
| **L29** | Understanding Software Quality attributes, McCall Model. |  |
| **L30** | ISO 9126 and CMM Model |  |
| **L31** | Software Risk Management : Types of Risks involved |  |
| **L32** | Phases of Risk Management |  |
|  | **UNIT 7: Project Integration and Scope Management** | **CO 4**  **CO 3**  **CO 5** | *2.Bob Hughes and Mike Cotterell (2001). Software Project Management. Tata McGraw Hill, New Delhi.* |  |  |
| **L33** | Project Selection and its methods; Understanding Project Scope |  |  |
| **L34** | Role and responsibilities of Project manager and project stakeholders |  |  |
| **L35** | Issues in project staff acquisition ; Team formation and development |  |
| **L36** | Project Life Cycle phases and its deliverables |  |

**GUIDELINES**

***Cell Phones and other Electronic Communication Devices*:** Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.

***E-Mail and online learning tool:*** Each student in the class should have an e-mail id and a pass word to access the LMS system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.

***Attendance:*** Students are required to have **minimum attendance of 75%** in each subject. Students with less than said percentage shall **NOT** be allowed to appear in the end semester examination.

**Course outcome assessment:** To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfillment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through quizzes, tests, assignment, Mid-term and/or End-term examinations. It is suggested that each examination is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which needs to be designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the Course Outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement.

***Passing criterion:*** Student has to secure minimum 30%/40% marks of the “highest marks in the class scored by a student in that subject (in that class/group class)” individually in both the ‘End-Semester examination’ and ‘Total Marks’ in order to pass in that paper.

* Passing Criterion for B. Tech: minimum 30% of the highest marks in the class
* Passing Criterion for M. Tech: minimum 40% of the highest marks in the class

**Sample format for Indirect Assessment of Course outcomes**

|  |
| --- |
| NAME: |
| ENROLLMENT NO: |
| SAP ID: |
| COURSE: |
| PROGRAM: |

Please rate the following aspects of course outcomes of Software Engineering & Project Management.

Use the scale 1-4\*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl. No. | Outcome | 1 | 2 | 3 | 4 |
| 1 | Identify, formulate, and solve engineering problems. |  |  |  |  |
| 2 | Understand various software process models such as the waterfall and evolutionary models. |  |  |  |  |
| 3 | Analyze, design, verify, validate, implement, apply, and maintain software systems. |  |  |  |  |
| 4 | Demonstrate effective teamwork and strong working knowledge of ethics and professional responsibility. |  |  |  |  |
| 5 | Manage the selection and initiation of individual projects. |  |  |  |  |
| 6 | Demonstrate effective project execution, quality control and risk management techniques that result in successful projects. |  |  |  |  |
| 7 | Conduct project planning activities that accurately forecast project costs, timelines and quality. |  |  |  |  |
| 8 | Conduct standard tests and measurements; to conduct, analyze, and interpret results; and to apply results to improve processes. |  |  |  |  |

3

Below Average

Good

1

**\***

Very Good

Average

4

2