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|---|---|---|---|
| Institute/ School Name | School of Engineering and Technology | | |
| Department Name | Department of Computer Science & Engineering | | |
| Program Name | Bachelor of Engineering (Computer Science & Engineering): B.E (CSE) | | |
| Course Code | 24IP002 | Course Name | Integrated Project-II |
| L-T-P (Per Week) | 0-0-4 | Course Credits | 02 |
| Academic Year | 2025-26 | Semester/Batch | 4th/2024-2028 |
| Pre-requisites (if any) | Basic knowledge of hardware components and programming languages | | |
| NHEQF Level | 5 | SDGs | 3,4,6,7,9,11-13,17 |
| Course Coordinator | Dr. Harpreet Kaur | | |

## 1. Scope and Objective of the Course:

The goal of this course is to enable students to transform their knowledge and ideas into practical outcomes. The course focuses on problem identification, teamwork, and developing software and/or hardware solutions through a STEM-based interdisciplinary approach. Emphasizing innovation and creativity, course fosters collaboration, strengthens skills, enhances problem-solving, improves employability, and supports sustainable development goals.

## 2. Programme Outcomes (POs):

| At the end of the programme, students will be able to achieve knowledge about the following: | |
|---|---|
| PO 1 | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| PO 2 | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations. |
| PO 6 | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| PO 7 | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO 8 | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO 9 | **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO10 | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| PO11 | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO12 | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

## 3. Course Learning Outcomes (CLO):

After completing the course, the students will be able to:

**CLO1:** Identify, formulate, and design a real-world problem.

**CLO2:** Recognize and select appropriate technologies that drive innovation and can be effectively implemented to solve problems.

**CLO3:** Apply engineering knowledge and ethical practices to develop effective solutions for real-world challenges.

**CLO4:** Understand team dynamics and work collaboratively in interdisciplinary environments.

**CLO5:** Acquire communication and professional skills to effectively present ideas to the engineering community, industry, and society, enhancing employability.

## 4. CLO-PO Mapping Matrix:

| Course Learning Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | NHEQF Level Descriptor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLO1 | - | M | M | H | M | - | M | - | - | - | L | H | Q5 |
| CLO2 | M | H | H | - | M | M | L | - | - | - | - | - | Q3 |
| CLO3 | H | | M | - | - | M | - | H | - | - | - | - | Q1,Q3,Q5 |
| CLO4 | - | - | - | - | - | - | - | M | H | - | M | H | Q4,Q6 |
| CLO5 | - | - | - | - | L | M | - | - | - | H | - | H | Q2,Q4 |

## 5. ERISE Grid Mapping:

| Feature Enablement | Level (1-5, 5 being highest) |
|---|---|
| Entrepreneurship | 3 |
| Research/Innovation | 3 |
| Skills | 5 |
| Employability | 4 |

## 6. Readings and relevant websites:

| Serial No. | Link of Journals, Magazines, Websites and Research Papers |
|---|---|
| R1 | https://nptel.ac.in/courses/106105166 |
| R2 | https://www.sih.gov.in/sih2025PS |
| R3 | https://infyspringboard.onwingspan.com |
| R4 | https://onlinecourses.swayam2.ac.in/imb25_mg26/preview |
| **Resource** | **Link of Audio-Video resources** |
| V1 | https://docs.github.com/en/get-started/start-your-journey/hello-world |
| V2 | https://sdgs.un.org/goals |
| V3 | https://www.elsevier.com/en-in/resources/10-major-engineering-challenges-of-the-next-decade. |

## 7. Recommended Tools and Platforms:

- Google Workspace
- Git/GitHub
- Microsoft Excel, Word and PowerPoint
- Tinker CAD for simulation of circuit design

8. **Industry Interventions:**

- Certification from recognized online learning and certification platforms: As per the selected project topic or technology, every student is required to obtain a relevant certification from the SWAYAM or NPTEL or Coursera, or Springboard portals.

9. **Innovative Pedagogies:**

- Case study-driven Interdisciplinary Learning (Annexure-I)
- Project-Based Learning (Annexure-II)

10. **Action plan for different types of learners**

| Slow Learners | Average Learners | Advanced Learners |
|---|---|---|
| Additional time and mentoring support during project work | Learner-Centric Online Tool Guidance for Project-Based Learning | Patent filing or research paper draft |

11. **Evaluation Scheme & Components:**

| Evaluation Component | Type of Component | No. of Assessments | Weightage of Component | Mode of Assessment (Offline / Online) |
|---|---|---|---|---|
| Internal Component | Online Certification* | 01 | 5% | Online |
| | Progress Review -1 (PR-1) | 01 | 20% | Offline |
| | Progress Review -2 (PR-2) | 01 | 25% | Offline |
| External Component | End Term Evaluation (ETE) | 01 | 50% | Offline |
| **Total** | | **100%** | | |

* Online Certification from the SWAYAM or NPTEL or Coursera or Springboard portals is mandatory.

12. **Details of Evaluation Components:**

| Evaluation Component | Description | Timeline of Completion | Weightage (%) |
|---|---|---|---|
| Internal Component | Online Certification | Week 1-14 | 5 |
| | PR-1 | Week 5-7 | 20 |
| | PR-2 | Week 8-14 | 25 |
| External Component* | End Term Evaluation* | As Notified by the Exam Cell | 50 |
| Total | | | 100 |

*Minimum 75% attendance is required to become eligible for appearing in the End Semester Examination.

13. **Format of Evaluation Components:**

| Type of Assessment | Total Marks | PPT | Report | Project Demonstration | Viva Voce | Creativity & Innovation | Interdisciplinary Collaboration | Addressing UNSDG Goals |
|---|---|---|---|---|---|---|---|---|
| Certification | 5 | - | - | - | - | - | - | - |
| PR-1 | 20 | 5 | - | - | - | 5 | 5 | 5 |
| PR-2 | 25 | - | 5 | 5 | 5 | 5 | 5 | - - |
| End Term Evaluation | 50 | 5 | 10 | 10 | 5 | 5 | 10 | 5 |

**14. Revision (if any):**

| Academic Year of Previous Version | 2024-2025 | Percentage of Revision | |
|---|---|---|---|
| **Topics Added:** | | | |
| | | | |

**15. This Document is:**

| Designation | Name | Signature |
|---|---|---|
| **Prepared by Course Coordinator** | Dr. Harpreet Kaur | Harpreet kaur |
| **Verified by Assistant Dean** | Dr. Hakam Singh | H. Singh. |
| **Date:** | 12/01/2026 | |

# ANNEXURE-I

## Case Study–Driven Interdisciplinary Learning

Case study–based learning, integrated with a STEM-driven interdisciplinary approach, enables students to analyze real-world, domain-specific scenarios to understand practical challenges and define meaningful project problem statements. By combining knowledge and skills from Science, Technology, Engineering, Arts, and Mathematics and fostering collaboration among diverse disciplines such as Computer Science, Pharmacy, and Nursing, this approach promotes critical thinking, research, innovation, creativity, and holistic solution design aligned with industry and societal needs.

**Sample Case Studies for defining Project Statement**

1. **Smart Healthcare Monitoring and Predictive Care System**

Integrates Computer Science (data analytics, AI), Pharmacy (drug adherence, dosage alerts), and Nursing (patient care workflows) to address challenges in continuous patient monitoring, especially in rural and elderly care.

2. **AI-Enabled Drug Inventory and Cold-Chain Management**

Focuses on optimizing pharmaceutical supply chains using IoT sensors, data analytics, and logistics engineering to reduce medicine wastage and ensure drug quality in hospitals and pharmacies.

3. **Assistive Technology for Patient Rehabilitation and Elderly Care**

Combines Engineering (wearable devices), Computer Science (mobile applications), Nursing (rehabilitation protocols), and Arts (user-centric design) to develop affordable assistive solutions for differently-abled and elderly individuals.

4. **Smart Campus Health, Safety, and Resource Management System**

Addresses institutional challenges by integrating sensor networks, software platforms, and healthcare practices to monitor safety, energy usage, hygiene, and health compliance on campuses.

5. **AI-Based Disease Outbreak Prediction and Awareness Platform**

Uses data science, epidemiological models, healthcare inputs, and visualization techniques to predict disease trends and support early intervention and public awareness.

6. **Sustainable Waste and Biomedical Waste Management System**

Combines environmental science, engineering design, software monitoring tools, and healthcare practices to manage waste efficiently while meeting regulatory and sustainability goals.

7. **Digital Therapeutics and Mental Health Support Platform**

Integrates psychology-informed care models, software development, data analytics, and creative content design to provide accessible mental health support solutions.

# ANNEXURE-II

## Project-Based Learning

The Software Development Life Cycle (SDLC) should be tailored and adapted to design and develop projects that focus on addressing real-world problems. By customizing the SDLC processes, teams can ensure that the methodologies and tools used align with the specific challenges and requirements of practical applications. This approach fosters the creation of solutions that are both relevant and impactful in addressing real-world needs effectively.

**1. Requirement Gathering and Analysis**

- Identify the purpose of the project.
- Gather information from stakeholders about the key aspects of the project (e.g., scope, timeline, resources, outcomes, risks, etc.).
- Define the structure and format of the document based on organizational requirements or standards.

**2. Design Models**

- Create a detailed outline or template of the project.
- To ensure the successful execution and evaluation of the project, it is essential to create a detailed outline or template that clearly defines the structure and scope. The template should include sections such as the **Project Overview**, which provides a summary of the project's purpose and context, and **Objectives and Goals**, which outlines the specific targets and outcomes the project aims to achieve. The **Evaluation Criteria** section should describe the standards and benchmarks used to assess the project's performance. **Performance Analysis** will analyze how well the project met its objectives and identify areas for improvement. The **Key Findings** section highlights the most important insights gained from the project, while **Recommendations** suggest actionable steps for future improvement or implementation.
- Define metrics and frameworks to evaluate project success (e.g., KPIs, qualitative analysis).

**3. Development**

- Collect all necessary data related to the project (e.g., timelines, budgets, stakeholder feedback, project deliverables).
- Write the document based on the predefined structure.
- Incorporate visuals, such as graphs, tables, or charts, to illustrate key data points.

**4. Testing/Review**

- Review the document for completeness, accuracy, and clarity.
- Ensure all evaluation criteria are addressed and supported by evidence.
- Get feedback from stakeholders and team members for revisions.
- Conduct quality checks, including grammar, formatting, and adherence to organizational standards.

**5. Implementation**

- Finalize the document after incorporating feedback and resolving inconsistencies.
- Share the completed document with stakeholders through appropriate channels.
- Present the findings and recommendations if required.