

## 203152: Project Based Learning

Teaching Scheme Practical : 04 Hrs/ Week	Credits PR:02	Examination Scheme [Marks] Term Work: 50 Marks
<p><b>Preamble:</b> For better learning experience, along with traditional classroom teaching and laboratory learning, project-based learning has been introduced to motivate students to learn by working in a group cooperatively to solve a problem. Project-Based Learning (PBL) is a student-centered and experimental approach to education promoting ‘deeper learning’ through active exploration of real-world problems and challenges. A central goal of PBL is to facilitate the deeper learning process and support students’ acquisition of complex cognitive competencies, e.g., rigorous content knowledge and critical thinking skills. The PBL engages students in the problem definition, design process, contextual understanding, and systems thinking approaches. In the PBL approach, learning based on memorization is de-emphasized and more emphasis is given on understanding and application of engineering design principles. Because of frequent assessments throughout the course, plagiarism can be more easily controlled.</p>		
<p><b>Course Objectives:</b> Objectives of this course are to</p> <ol style="list-style-type: none"> <li>1. Impart technical knowledge and skills, and develop deeper understanding to integrate knowledge and skills from various areas.</li> <li>2. Build critical thinking, problem-solving, communication, collaboration and creativity, and innovation amongst students</li> <li>3. Make students aware of their own academic, personal, and social developments.</li> <li>4. Develop habits of self-evaluation and self-criticism, against self-competency and trying to see beyond own ideas and knowledge</li> </ol>		
<p><b>Course Outcomes:</b> At the end of this project-based learning, students will be able to</p> <p><b>CO1:</b> Identify, formulate, and analyze the simple project problem.</p> <p><b>CO2:</b> Apply knowledge of mathematics, basic sciences, and electrical engineering fundamentals to develop solutions for the project.</p> <p><b>CO3:</b> Learn to work in teams, and to plan and carry out different tasks that are required during a project.</p> <p><b>CO4:</b> Understand their own and their team-mate's strengths and skills.</p> <p><b>CO5:</b> Draw information from a variety of sources and be able to filter and summarize the relevant points.</p> <p><b>CO6:</b> Communicate to different audiences in oral, visual, and written forms.</p>		
<p><b>Procedure:</b> A group of 4-5 students will be assigned to a faculty member called a mentor. Based on the engineering knowledge of a group and societal and industry problems, the mentor has to guide a group to identify project problems and plan the work schedule. Here, the expected outcomes of the project must be noted. The complete work-plan should be divided in the form of the individual tasks to be accomplished with targets. Weekly review of the completed task should be taken and further guidelines are to be given to a group. The final activity will be presenting the work completed and submitting the report. A group should be promoted to participate in a competition or write a paper.</p> <p>A problem needs to refer back to a particularly practical, scientific, social, and/or technical domain. The problem should stand as one specific example or manifestation of more general learning outcomes related to knowledge and/or modes of inquiry. There are no commonly shared criteria for what constitutes an acceptable project. Projects vary greatly in the depth of the questions explored, the clarity of the learning goals, the content, and the structure of the activity. It may have</p> <ul style="list-style-type: none"> <li>✓ A few hands-on activities that may or may not be multidisciplinary.</li> <li>✓ Use of technology in meaningful ways to help them investigate, collaborate, analyze, synthesize, and present their learning.</li> <li>✓ Activities on solving real-life problems, investigation /study, and writing reports of in-depth study, fieldwork.</li> </ul>		
<p><b>Assessment:</b></p> <p>The department/mentor is committed to assess and evaluate both students’ performance and course effectiveness. The progress of PBL is monitored regularly every week. During the process</p>		

of monitoring, continuous assessment and evaluation the individual and team performances are to be measured by supervisor /mentor and authorities.

Students must maintain an institutional culture of authentic collaboration, self-motivation, peer-learning, and personal responsibility. The institution/department should support students in this regard through guidance/orientation programs and the provision of appropriate resources and services. Supervisor/mentor and students must actively participate in the assessment and evaluation processes. Groups may demonstrate their knowledge and skills by developing a solution to the problem, public product, and/or report and/or presentation.

- ✓ Individual assessment for each student (Understanding individual capacity, role, and involvement in the project)
- ✓ Group assessment (roles defined, distribution of work, intra-team communication and togetherness)
- ✓ Documentation and presentation

#### **Evaluation and Continuous Assessment:**

It is recommended that all activities are to be recorded in a PBL workbook regularly, regular assessment of work to be done and proper documents are to be maintained at the department level by both students as well as a mentor. Continuous Assessment Sheet (CAS) is to be maintained by all mentors/department. Recommended parameters for assessment, evaluation, and weightage are as follows.

- ✓ Idea Inception (5%)
- ✓ Outcomes of PBL/ Problem Solving Skills/ Solution provided/ Final product (50%) (Individual assessment and team assessment)
- ✓ Documentation (Gathering requirements, design and modeling, implementation/execution, use of technology and final report, other documents) (25%)
- ✓ Demonstration (Presentation, User Interface, Usability, etc.) (10%)
- ✓ Contest Participation/ publication (5%)
- ✓ Awareness /Consideration of -Environment/ Social /Ethics/ Safety measures/Legal aspects (5%)
- ✓ PBL workbook will serve the purpose and facilitate the job of students, mentors, and project coordinator. This workbook will reflect accountability, punctuality, technical writing ability and work flow of the work undertaken

## 303152: Internship

Teaching Scheme			Credits		Examination Scheme	
IN	04	Hr/Week	IN	04	TW	100 Marks

### Preamble

Internship is a short-term industrial working experience for the students. The internship aims at providing entry-level exposure to a particular industry. It is expected that students should spend time working on relevant projects or part of the project and acquire learning about the field, along with developing industry connections, and employability skills.

### Course Objectives:

1. Encourage and provide opportunities to the students to acquire professional learning experiences.
2. Empower students to relate and then apply the theoretical knowledge in real-life industrial situations.
3. Provide exposure for handling and using various tools, measuring instruments, meters, and technologies used in industries.
4. Enable students to develop professional and employability skills and expand their professional network.
5. Empower students to apply the internship learnings to the academic courses and project completions.
6. Impart professional and societal ethics in students through the internship.
7. Make students aware of social, economic, and administrative aspects influencing the working environment of the industry.

### Course Outcomes: At the end of this course, student will be able to

<b>CO1</b>	Understand the working culture and environment of the Industry and get familiar with various departments and practices in the industry.
<b>CO2</b>	Operate various meters, measuring instruments, tools used in industry efficiently and develop technical competence.
<b>CO3</b>	Apply internship learning in other course completions and final year project management, i.e. topic finalization, project planning, hardware development, result interpretations, report writing, etc.
<b>CO4</b>	Create a professional network and learn about ethical, safety measures, and legal practices.
<b>CO5</b>	Appreciate the responsibility of a professional towards society and the environment.
<b>CO6</b>	Identify career goals and personal aspirations.

**Guidelines:** The guidelines related to the internship are given below.

**Duration:** Guidelines related to duration are as follows.

1. The internship should be started after semester 5 and should be completed before the commencement of semester 6.
2. It should be for at least 4 to 6 weeks.
3. It should be assessed and evaluated in semester 6.

### 2. Internship Identification:

A student may choose to undergo an Internship at Industries, Government organizations, NGOs, Micro-Small-Medium enterprises, startups, Innovation and Incubation Centers, Institutes of National interests, organizations working for rural development, organizations promoting IPR and Entrepreneurship, etc. Approaching various industries for Internships and finalizing the same should be initiated in the 5<sup>th</sup> semester in consultation with Institute's Training and Placement Cell, Industry-Institute Cell, or Internship Cell. This will help students to start their internship work on time. Also, it will allow students to work in a vacation period after their 5<sup>th</sup>-semester examination and before the start of the 6<sup>th</sup> semester. Student can take internship work in the form of Online/Onsite work from any

of the following but not limited to:

1. Working for consultancy or the funded research project of the institute/Department.
2. Contributing at Incubation, Innovation, Entrepreneurship Cell, Institutional Innovation Council, Start-up Cell of Institute where students will get learning opportunities on projects.
3. Learning at Departmental Lab leading to lab development and modernization, Tinkering Lab, Institutional workshop for prototyping and model development, etc.
4. Working at Industry or Government Organization on project or part of the project.
5. Internship through Internshala, AICTE, Government initiatives, etc.
6. In-house product or working model development, intercollegiate, inter-department research under research lab or research group, etc.
7. Working at micro-small-medium enterprises on solving their specific problems.
8. Research internship under professors at IISc, IIT's, NIT's, Research organizations, etc.
9. Working with NGOs or Social Internships, Rural Internship, etc.

Further, other internship opportunities should be discussed and finalized in consultation with Department/Institute constituted committees for Internship.

### 3. Internship Record Book:

Students must maintain an Internship record book. The main purpose of maintaining a record book is to nurture the habit of documenting and keeping records by students. The students should maintain the record of daily activities completed which may include, field visits, important discussions, observations, project work completed, suggestions received, etc. The record book should be signed every day by the supervisor or in-charge where the student is undergoing an internship. The internship record book and well-drafted Internship Report should be submitted by the students to the department faculty coordinator within a week after the completion of the internship.

### 4. Internship Evaluation:

The evaluation of activities recorded in the Internship Record Book will be done by Program Head, Cell In-charge, Project Head, faculty mentor, or Industry Supervisor based on the overall compilation of internship activities, sub-activities, the level of achievement expected, and the duration for certain activities. Assessment and Evaluation are to be done in consultation with the internship supervisors (Internal from the institute and External from industry).

### 5. Evaluation and Assessment of Internship:

Internship Record Book – 25 Marks + Internship Report - 25 Marks + Post Internship Internal Evaluation-50 Marks = Total 100 Marks

**5.1 Internship Record Book:** The attendance record of the student along with the evaluation sheet, duly signed and stamped by the industry should be submitted by the industry Supervisor or Mentor to the Institute/Department after the completion of the internship. The internship record book may be evaluated based on the following criteria:

- Proper and timely documented entries
- Adequacy and quality of information
- Data, observations, discussions recorded
- Thought process and recording techniques used
- Organization of the information

**5.2 Internship Report:** After completion of the Internship, the student should prepare a comprehensive report to indicate what he/she has observed and learned in the internship period. The report shall be presented covering the following recommended fields but not limited to:

- Title/Cover Page
- Internship certificate with details like company name, location, duration, supervisor, etc.
- Institute Certificate
- Declaration
- Abstract
- Index/Table of Contents
- List of Figures/Tables
- **Chapter 1:** Introduction: Brief about company, industry or organization, objectives, motivation, organization of the report
- **Chapter 2:** Problem Identification/Problem statement/objectives and scope/expected outcomes
- **Chapter 3:** Methodological details
- **Chapter 4:** Results / Analysis /inferences and conclusion
- **Chapter 5:** Suggestions/Recommendations for improvement to industry, if any
- Attendance Record
- Acknowledgement
- List of reference (Library books, magazines, and other sources)

**5.3 Post Internship Internal Evaluation:** The student will give a presentation based on his Internship report before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

1. Internship Identification and Selection
2. Problem Studied with objectives and expected outcomes
3. Consideration of Environment/ Social /Ethics/ Safety measures/Legal aspects.
4. Methodology/System/Procedure Q&A
5. Block-diagram, flow-chart, algorithm, system description Q&A
6. Final results, discussions, suggestions, comments, etc. Q&A
7. Presentation and Communication

#### **6. Feedback from internship supervisor (External and Internal)**

Post internship, the faculty Internship coordinator should collect feedback about the student on the following suggested parameters from Industry Supervisor.

- Technical knowledge,
- Discipline and Punctuality,
- Work Commitment,
- Willingness to do the work,
- Communication skills, etc.

## 403152: Project Stage II

Teaching Scheme			Credits		Examination Scheme	
SEM/P W/IN	12	Hrs./Week	SEM/PW/IN	6	ORAL	50
					Termwork	100

### Preamble:

Project is an important part of the engineering curriculum covered in the final year. It is divided into Project Stage I and Project Stage II in Semesters I and II of the Final Year. This project is a substantial piece of work that will require creative activity and original thinking. The project aims to provide students with a transitional experience from the academic world to the professional world. The objectives, outcomes, and guidelines for Project Stage II are given below.

### Course Objectives:

The objectives of this course are to:

1. Provide an opportunity to learn new software, interdisciplinary theory, concept, technology, etc. not covered in earlier subjects
2. Empower students to use engineering knowledge and skills learned in previous courses to deliver a product that has passed through the design, analysis, testing, and evaluation
3. Encourage multidisciplinary project work through the integration of knowledge
4. Allow students to develop problem-solving, analysis, synthesis, and evaluation skills.
5. Encourage teamwork.
6. Improve students' communication skills by asking them to produce both a professional report and to give an oral presentation
7. Exposed to the project management skills and ethical practices in project

### Course Outcomes:

Course outcomes can be different for the different projects undertaken by the student groups. However, in general, the course outcomes for Project Stage-II can be stated as follows.

At the end of this course, students should be able to:

CO1: Identify tools, techniques, methods, concepts, measuring devices, and instruments required for the project to define the methodology of the project

CO2: Justify the selection of electrical, electronic and mechanical components for the project prototyping

CO3: Select the appropriate testing method for system performance evaluation

CO4: Interpret results obtained by simulation, and hardware implementation and decide on further action or write a conclusion

CO5: Write a project report and research paper on the project work

### Guidelines:

Termwork evaluation guidelines are given below.

Sr. No.	Activity	Deadline (Semester II)	Parameters for Evaluation
1	Progress Review- 3 Presentation	Up to 6 <sup>th</sup> Week	Revised Final Design (10) Tools and Techniques Used with justification (10) Partial Implementation/ development (15) Partial Results (15)



			<b>Total Marks (50)</b>
2	Progress Review- 4 Presentation	Up to 12 <sup>th</sup> Week	Implementation Status of project (10) Testing and Evaluation (10) Intermediate Results (15) Conclusion (10) <u>Future Scope (5)</u> <b>Total Marks (50)</b>
3	Submission of Project Stage –II Report	Up to 14 <sup>th</sup> Week	Timely submission (5) Formatting and Report Writing Style (5) Abstract, Literature Survey, Conclusion (10) Grammatical correctness in the report (5) <u>Publication/participation in project exhibition (20)</u> <b>Total Marks (50)</b>  <b>Review 3+ Review 4+ Final Project Report = 150 Rounded to 100 Marks</b>

**Guidelines to students:**

1. Continue with the same group and identify opportunities for self-learning and upgrading skills.
2. Actively participate in all the activities related to the project.
3. Document the project in the form of a hard-bound report at the end and submit it to the department.
4. Attempt to make a prototype, working model, and demonstration of the project to display during the final presentation.
5. Participate in project competitions, paper presentations, etc.
6. Maintain an institutional culture of authentic collaboration, self-motivation, peer learning, and personal responsibility.
7. Maintain a notebook to keep records of all the meetings, discussions, notes, etc. This is to be done by the individual student and submitted at the end to the supervisor or guide.
8. Some parameters, mentioned in the above table, will be evaluated and assessed at a group level and some at an individual level.

## 403145: Project Stage I

Teaching Scheme			Credits		Examination Scheme	
SEM/P W/IN	4	Hrs./Week	SEM/PW/IN	2	ORAL	50
					Term work	50

### Preamble:

Project is an important part of the engineering curriculum covered in the final year. It is divided into Project Stage I and Project Stage II at Semesters I and II of the Final Year. This project is a substantial piece of work that will require creative activity and original thinking. The project aims to provide students with a transitional experience from the academic world to the professional world. The objectives, outcomes, and guidelines for Project Stage I are given below.

### Course Objectives:

The objectives of this course are to:

1. Provide an opportunity to learn new software, interdisciplinary theory, concepts, technology, etc. not covered in earlier subjects.
2. Empower students to use engineering knowledge and skills learned in previous courses to deliver a product that has passed through the design, analysis, testing, and evaluation.
3. Encourage multidisciplinary project work through the integration of knowledge.
4. Allow students to develop problem-solving, analysis, synthesis, and evaluation skills.
5. Encourage teamwork.
6. Improve students' communication skills by asking them to produce both a professional report and to give an oral presentation.

### Course Outcomes:

Course outcomes can be different for the different projects undertaken by the student groups. However, in general, the course outcomes for Project Stage-I can be stated as follows.

At the end of this course, students should be able to:

CO1: Define the project problem statement and identify the scope of the project.

CO2: Search the appropriate research papers, standards and e-resources and write a literature survey.

CO3: Identify tools, techniques, methods, concepts, measuring devices, and instruments required for the project to define the methodology of the project.

CO4: Justify the selection of electrical, electronic and mechanical components for the project prototyping

CO5: Simulate or develop a system for software or hardware verification.

CO6: Write a project report with proper interpretation of results.

#### Guidelines for students:

1. Form a group of 3-4 students.
2. Select a project problem statement based on an industrial or societal issue and ideate on it.
3. Research on the project topic through existing theories, literature, technology, patents, etc.
4. Define objectives, scope, and outcomes of the project in the 1st presentation.
5. Maintain a notebook to keep records of all the meetings, discussions, notes, etc. This is to be done by the individual student.
6. Some of the parameters mentioned in the above table will be evaluated and assessed at the group



level and some at an individual level.

## Guidelines:

Term work evaluation guidelines are given below.

Sr. No.	Activity	Deadline (Semester I)	Parameters for Evaluation
1.	Topic Approval Presentations	Up to 3 <sup>rd</sup> Week	<ul style="list-style-type: none"> <li>● Problem definition clearly stated (YES/NO)</li> <li>● Objectives clearly defined (YES/NO)</li> <li>● The overall project idea is feasible (YES/NO)</li> </ul>
2.	Progress Review-1 Presentation	Up to 8 <sup>th</sup> Week	<ul style="list-style-type: none"> <li>● Problem Definition (5)</li> <li>● Scope &amp; Objectives (10)</li> <li>● Literature Review (10)</li> <li>● Methodology (10)</li> <li>● Block Diagram / Architecture (10)</li> <li>● <u>Project Planning (5)</u></li> <li>● <b>Total Marks (50)</b></li> </ul>
3.	Progress Review-2 Presentation	Up to 12 <sup>th</sup> Week	<ul style="list-style-type: none"> <li>● Requirement Specification (10)</li> <li>● Literature Review (revised) (5)</li> <li>● Detailed Design (10)</li> <li>● Experimental Setup/Simulation (10)</li> <li>● Performance Parameters (10)</li> <li>● <u>Partial Conclusion (5)</u></li> <li>● <b>Total Marks (50)</b></li> </ul>
4.	Submission of Project Stage –I Report	Up to 14 <sup>th</sup> Week	<ul style="list-style-type: none"> <li>● Timely submission (5)</li> <li>● Formatting and Report Writing Style (5)</li> <li>● Abstract, Literature Survey, Conclusion (5)</li> <li>● Refereed References (5)</li> <li>● <u>Grammatical correctness in the report (5)</u></li> <li>● <b>Total Marks (25)</b></li> </ul> <p><b>(Review 1+ Review 2) conversion to 25 marks +Report (25 marks) = 50 Marks</b></p>