

# PROJECT ENGINEERING AND MANAGEMENT

ENEE 301

**Lecture** : 3  
**Tutorial** : 1  
**Practical** : 0

**Year** : III  
**Part** : I

## Course Objectives:

The objective of this course is to provide concepts, principles, and practices of project management, focusing on project planning, analysis, scheduling, monitoring, and control. By the end of the course, students will be able to evaluate project viability and apply modern management tools such as Gantt charts, Program Evaluation and Review Technique (PERT), Critical Path Method (CPM), Agile, and Scrum for effective scheduling, monitoring, and resource optimization.

## 1 Basics of Project Management

(4 hours)

### 1.1 Fundamentals

1.1.1 Definition, objectives, evolution (Traditional to agile)

1.1.2 Types of projects (Infrastructures, research and development)

1.1.3 Project versus operations

### 1.2 Key elements

1.2.1 Triple constraints (Scope, time, cost)

1.2.2 Stakeholder management, risk, quality, communication

### 1.3 Project life cycle

1.3.1 Initiation, planning, execution, monitoring, closure

1.3.2 Role of project management body of knowledge, agile frameworks

## 2 Project Initiation and Planning

(8 hours)

### 2.1 Project initiation

2.1.1 Opportunity analysis, SWOT analysis, business case

2.1.2 Project charter, scope statement (Smart goals)

### 2.2 Feasibility study

2.2.1 Technical, financial, economic and environmental

2.2.2 Cost estimation (Top-down versus bottom-up)

### 2.3 Project appraisal

2.3.1 Payback period, NPV, IRR, social cost-benefit analysis

2.3.2 Risk assessment (Qualitative and quantitative)

## 3 Project Scheduling and Resource Management

(8 hours)

### 3.1 Scheduling techniques

3.1.1 Work breakdown structure (WBS)

- 3.1.2 Gantt charts and milestone tracking
- 3.1.3 CPM and PERT
- 3.2 Resource management
  - 3.2.1 Resource allocation, leveling, and optimization
  - 3.2.2 Budgeting, material and human resource planning

**4 Project Procurement and Contracts (6 hours)**

- 4.1 Procurement strategies
  - 4.1.1 Make-or-buy decision
  - 4.1.2 Vendor selection
  - 4.1.3 Expression of interest, requests for proposal, bidding process, contract types (Fixed-price, cost-plus)
- 4.2 Supply chain and legal aspects
  - 4.2.1 Procurement in agile versus traditional projects
  - 4.2.2 Contract management, dispute resolution

**5 Monitoring, Control and Information Systems (4 hours)**

- 5.1 Project control
  - 5.1.1 Earned value managements (EVM)
  - 5.1.2 Key performance indicators (KPIs), dashboards, variance analysis
- 5.2 Information systems
  - 5.2.1 Software and tools
  - 5.2.2 Reporting and communication plans

**6 Evaluation, Auditing and Impact (4 hours)**

- 6.1 Project evaluation
  - 6.1.1 Post-mortem analysis, lessons learned
  - 6.1.2 Return on investment, social and environmental impact
- 6.2 Auditing: Compliance, quality audits, ISO standards

**7 Project Closure (3 hours)**

- 7.1 Closing process
  - 7.1.1 Handover, documentation, final reports
  - 7.1.2 Contract closure, resource release
- 7.2 Lessons learned: Best practices, failure analysis

**Tutorial (15 hours)**

- 1. Project initiation and planning
- 2. Project scheduling and resource management: WBS, PERT and CPM tools
- 3. Administration task and exercise contracts
- 4. Monitoring, control and information systems exercise
- 5. Evaluation, auditing and impact
- 6. Project closure

7. Practical component: Group project
  - Group work of students (4-5 members) on a real-world project simulation
  - Use of project management software
  - Final presentation and report submission (Gantt chart, risk log, budget plan)

### Final Exam

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Chapter	Hours	Marks distribution*
1	4	5
2	8	10
3	8	10
4	8	10
5	8	10
6	6	10
7	3	5
<b>Total</b>	<b>45</b>	<b>60</b>

\* There may be minor deviation in marks distribution.

### References

1. Project Management Institute. (2021). A guide to the project management body of knowledge (PMBOK® Guide). Project Management Institute.
2. Kerzner, H. (2025). Project management: A systems approach to planning, scheduling, and controlling. Wiley.
3. Microsoft Corporation. (2024). Project Professional 2024.
4. Oracle Corporation. (2024). Primavera P6 Enterprise Project Portfolio Management.