- Social Processes of Globalization

Engineers and Sociology

- Understanding Social Responsibilities of an Engineer
- Engineers Bringing Social Change

Community Development Involving Engineers

- Meaning, Scope and Subject Matter of Community Development
- Processes of Community Development
- Role of Engineers in Community Development

Case Studies Regarding Sociology Concerning Engineers

Recommended Books:

- Sociology by John J. Macionis, 16th edition, Pearson Education, ISBN 978 0134206318

Engineering Economics

Contact Hours:
Theory = 48
Practical = 0
Total = 48

Credit Hours:
Theory = **3.0**
Practical = **0.0**
Total = **3.0**

SUGGESTED COURSE LEARNING OUTCOMES:

Upon successful completion of the course, the student will be able to:

Ser	CLO	Domain	Taxonomy level	PLO
1.	Apply the appropriate engineering economics analysis method(s) for problem solving i.e. present worth, annual cost, rate of return, payback, break-even, benefit-cost ratio.	Cognitive	C3	11
2.	Evaluate the cost effectiveness of individual projects using the methods learnt, draw inferences for investment decisions, and compare the life cycle cost of multiple projects.	Cognitive	C4	11
4.	Compute the depreciation of an asset using standard depreciation techniques to assess its impact on present or future value	Cognitive	C2	11

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):

The course is designed so that students will achieve the following PLOs:

1	Engineering Knowledge:	☐	7	Environment and Sustainability:	☐
2	Problem Analysis:	☐	8	Ethics:	☐
3	Design/Development of Solutions:	☐	9	Individual and Team Work:	☐
4	Investigation:	☐	10	Communication:	☐
5	Modern Tool Usage:	☐	11	Project Management:	☑
6	The Engineer and Society:	☐	12	Lifelong Learning:	☐

Course outline:

Engineering economics decision

- Role of engineers in business
- Economic decisions v/s design decisions
- Large scale engineering projects and types of strategic economic decisions
- Fundamental principles of engineering economics

Interest Rate and Economic Equivalence

- Interest: The Cost of Money
- Economic Equivalence
- Development of Formulas for Equivalence Calculation
- Unconventional Equivalence Calculations

Understanding Money and Its Management

- Nominal and Effective Interest Rates
- Equivalence Calculations with Effective Interest Rates and with Continuous Payments
- Changing Interest Rates
- Debt Management
- Investing in Financial Assets

Present-Worth Analysis

- Project Cash Flows
- Initial Project Screening Methods: payback Screening and Discounted Cash Flow Analysis
- Variations of Present-Worth Analysis
- Comparing Mutually Exclusive Alternatives

Annual Equivalent-Worth Analysis

- Annual Equivalent-Worth Criterion
- Capital Costs versus Operating Costs
- Applying Annual-Worth Analysis
- Life-Cycle Cost Analysis
- Design Economics

Rate-of-Return Analysis

- Rate of Return and Methods of Finding It
- Internal Rate-of-Return Criterion
- Mutually Exclusive Alternatives

Cost Concepts Relevant to Decision Making

- General Cost Terms; Classifying Costs for Financial Statements
- Cost Classifications for Predicting Cost Behavior
- Future Costs for Business Decisions
- Estimating Profit from Production

Depreciation and Corporate Taxes

- Asset Depreciation: Economic versus Accounting
- Book and Tax Depreciation Methods (MACRS)
- Depletion
- Income Tax Rate to be used in Economic Analysis
- The Need for cash Flow in Engineering Economic Analysis

Developing Project Cash Flows

- Cost-Benefit Estimation for Engineering Projects
- Developing Cash Flow Statements

Project Risk and Uncertainty

- Origins of Project Risk
- Methods of Describing Project Risk: Sensitivity, Break-Even and Scenario Analysis

Special Topics in Engineering Economics

- Replacement Decisions
- Capital Budgeting Decisions
- Economic Analysis in the Service Sector

Recommended Books:

- Contemporary Engineering Economics by Chan S. Park, 6th edition, Pearson 2015, ISBN: 978-0134105598
- Engineering Economic Analysis by Donal G. Newnan, Jerome P. Lavelle, Ted G. Eschenbach, 12th edition, Oxford University Press, ISBN: 978-0199339273
- Engineering Economy by Leland T. Blank and Anthony Tarquin

Engineering Project Management

Contact Hours:	**Credit Hours:**
Theory = 48	Theory = **3.0**
Practical = 0	Practical = **0.0**
Total = 48	Total = **3.0**

SUGGESTED COURSE LEARNING OUTCOMES:

Upon successful completion of the course, the student will be able to:

Ser	CLO	Domain	Taxonomy level	PLO
1.	Understand a sustainable lifestyle and why a sustainable society is important for the environment.	Affective	A1	7
2.	Compare competency in various project management knowledge areas, including, Risk, Quality, Stakeholder, Time and Cost management.	Cognitive	C2	11
3.	Solve the complex tasks of time and cost estimation using project scheduling and controlling techniques including Critical Path Method and Earned Value Management.	Cognitive	C3	11
4.	Integrate various Knowledge areas of project management in order to prepare a project plan on a simulation level using modern tool e.g. MS Project.	Affective	A2	5

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):
The course is designed so that students will achieve the following PLOs:

1	Engineering Knowledge:	☐	7	Environment and Sustainability:	☑
2	Problem Analysis:	☐	8	Ethics:	☐
3	Design/Development of Solutions:	☐	9	Individual and Team Work:	☐
4	Investigation:	☐	10	Communication:	☐
5	Modern Tool Usage:	☑	11	Project Management:	☑
6	The Engineer and Society:	☐	12	Lifelong Learning:	☐

Course outline:

- **Introduction to Project Management**
  - Project, program management and project management
  - Historical perspective of project management
  - Project characteristics, objectives, scope and requirements
  - Introduction to existing PM Bodies of Knowledge
- **Project Quality Management**
  - History of Quality Management
  - Defining Quality
  - Relationship between project management and quality management
  - Quality Management Frameworks
- **Project Stakeholder Management**
  - The Roles of Project Manager and Sponsor
  - Project team selection
  - Skills and competencies of project manager
  - How to develop and manage project teams successfully
  - Stakeholder management
- **Project Cost Management**
  - Cost Estimation in projects
    - Cost components in projects and methods for cost estimation in projects
  - Cost Control in Projects
    - Estimation of outstanding work
    - Engineering Economics (Earned value management)
- **Project HRM and Communication Management**
  - Effective organization and communication
  - The emergence of project management in developing company
  - Project matrix and project based organizations
  - Building and managing effective project team
- **Project Risk Management**
  - Definitions and concepts including risk, risk management, business and project risk, probability and impact.
  - Generic risk management processes.
- **Project Time Management**

- Introduction to Project Scheduling
- Critical Path Method
  - Network representation of projects, critical activities, and critical path.

- **Project Scope and Integration Management**
  - Selecting the Suitable Project for the Organization
  - Conducting Feasibility Study
  - Phases of project and the different activities carried out in each phase.
  - Lifecycle models and examples
  - Project management methodologies and processes
  - Traditional, structured and agile approach to project delivery
- **Project Closure**
  - Project Evaluation
    - Defining project and project management success
    - Success Criteria for Projects
    - Project Audits
  - Project Termination
    - When to terminate a project
    - The verities of project termination
    - The termination process
- **Environmental and sustainable development projects**
  - Importance of Sustainable development
  - Sustainability and project management
  - Evaluation of sustainable development projects from various sectors

Recommended Books:

- Project Management: A System Approach to Planning Scheduling and Controlling by Harold Kerzner, 11th edition, John Willey 2013, ISBN: 978-1-118-02227-6
- Project Management: A managerial approach 7th edition, Jack R. Meredith and Samuel J. Mantel, Jr. John Wiley and Sons, Inc. Project Management for Business, ISBN: 13 978-0-470-22621-6
- Engineering and Technology: Principles and Practice 3rd Edition, by John M. Nicholas and Herman Steyn, Elsevier Publications ISBN: 978-0-7506-8399-9
- Project Management: A Strategic Planning Approach by Paul Gardiner, 2nd Edition, Palgrave Macmillan, 2017,ISBN 9780230545106