

MGTS 403 – ENGINEERING MANAGEMENT

Credit Hours: 3

The main objective of the course is to provide an overview of the field of engineering management. The course examines the functions of technology management followed by managing technology and project, and professional ethics and practice. The course also intends to prepare students for careers in engineering and technical management.

Unit 1: Introduction to Engineering Management

1. **Engineering and Management:** Introduction to Engineering, Management, and Engineering Management (2 Hrs)
2. **Historical Development of Engineering Management:** Origins of Engineering Management, Basic Management Philosophies - Major Contributions of Scientific Management, Administrative Management, Behavioral Management, Contemporary Contributions to Management Theory (4 Hrs)

Unit 2: Functions of Technology Management

1. **Planning and Forecasting:** Planning/Decision Making Process, The Foundation for Planning, Fundamental Planning Concepts, Forecasting – Qualitative and Quantitative Methods, Technological Forecasting, Strategies for Managing Technology, Numerical Problems (4 Hrs)
2. **Decision Making:** Routine and Nonroutine Decisions, Objective versus Bounded Rationality, Management Science, Categories of Decision Making, Management Information/Decision Support Systems, Expert Systems, Numerical Problems (3 Hrs)
3. **Organizing:** Legal Forms of Organizations, Traditional Organization Theory, Technology and Modern Organization Structures, Teams (2 Hrs)
4. **Human Aspects of Organizing:** Staffing Technical Organizations, Authority and Power, Delegation, Committees and Teams (2 Hrs)
5. **Leading Technical People:** Leadership and Management, Nature of Leadership, Motivation and Leadership Theories, Motivating and Leading Technical Professionals (4 Hrs)
6. **Controlling:** The Process of Control, Financial and Nonfinancial Controls (2 Hrs)

Unit 3: Managing Technology

1. **Managing Research and Development:** Product and Technology Life Cycles, Nature of Research and Development, Research Strategy and Organization, Selecting R&D Projects, Making R&D Organizations Successful, Protection of Intellectual Property, Creativity and Innovation (4 Hrs)
2. **Managing Engineering Design:** Nature of Engineering Design, Systems Engineering/New Product Development, Concurrent Engineering and CALs, Control Systems in Design, Design Criteria - Product Liability and Safety, Designing for Reliability, Maintainability, Availability, Human Factors, Standardization, Producibility, Value Engineering (4 Hrs)
3. **Production Planning and Management:** Enterprise Resource Planning, Just-in-Time, Lean Manufacturing, Supply Chain Management, Concepts of Quality, Process Control Charts, Total Quality Management, Deming's Principles, Six Sigma, ISO Standards, Types of Maintenance, Total Productive Maintenance, Agile Methodology (Scrum and Kanban) (2 Hrs)
4. **Engineers in Marketing and Service Activities:** Engineers Involvement in Marketing, Introducing New Technology into the Market, Engineers in Service Organizations (2 Hrs)

Unit 4: Managing Projects

1. **Project Planning and Acquisition:** Characteristics of a Project, The Project Proposal Process, Project Planning Tools - CPM and PERT (2 Hrs)
2. **Project Organization, Leadership and Control:** Project Organization, Characteristics of Effective Project Manager, Developing Project Management Skills, Motivating Project Performance, Types of Contracts (2 Hrs)

Unit 5: Managing your Engineering Career

1. Engineering Ethics: Professional Ethics and Conduct, Engineering Code of Ethics, Ethical Dilemmas in Professional Practice, Conflict of Interest, Whistle Blowing, Making Ethical Decisions (2 hrs)
2. **Achieving Effectiveness as an Engineer:** Understanding Your Work, Boss and Associates, Charting Your Engineering Career, Effective Communication, Staying Technically Competent, Professional Societies, Accreditation, Registration, and Certification, Management and the Engineer, Managing Your Time, (2 hrs)

Basic Text Book:

- Daniel L. Babcock, Lucy C. Morse (2014), *Managing Engineering and Technology*, Prentice Hall India.

Reference Books:

- Management in Engineering: Principles and Practice – Gail Freeman-Bell, James Balkwill
- Management - James Stoner, R. Edward Freeman, Daniel Gilbert
- Management: A Global Perspective, McGraw-Hill - Heinz Weihrich, Harold Koontz
- The Practice of Management – Peter F. Drucker
- Project Management: A Managerial Approach – Jack R. Meredith, Samuel J. Mantel
- Managing for Total Quality – N. Logothetis
- A New American TQM: Four Practical Revolutions in Management - S Shiba, A Graham, D Walden
- Juran's Quality HandBook - Joseph M. Juran, A Blanton Godfrey
- Statistical Method from the Viewpoint of Quality Control - Walter A Shewhart
- What is Total Quality Control? The Japanese Way - Kaoru Ishikawa

Evaluation Scheme:

- In-semester Evaluation: 50%
- End-semester Evaluation: 50%