

Curriculum for M.Sc. Engineering Management

(Semester System)

(Effective from Session-2021 and Onwards)

Sr. No	Core Courses (Compulsory)		Credit Hours
1	EM-501	Human Resource Management	(3,0)
2	EM-502	Operations Management	(3,0)
3	EM-503	Project Management	(3,0)
4	EM-504	Total Quality Management	(3,0)
Sr. No	Elective Courses		
1	EM-505	Principles of Engineering Management	(3,0)
2	EM-506	Economic Decisions in Engineering	(3,0)
3	EM-507	Environmental Management and Safety	(3,0)
4	EM-508	Legal and Ethical Aspects in Engineering Management	(3,0)
5	EM-509	Business Communications	(3,0)
6	EM-510	Industrial Marketing Management	(3,0)
7	EM-511	Operations Research	(3,0)
8	EM-512	Logistics and Supply Chain Management	(3,0)
9	EM-513	Research Methodology in Engineering Management	(3,0)
10	EM-514	Sustainability in Operations	(3,0)
11	EM-515	Management Information Systems	(3,0)
12	MF-502	Production Planning and Control	(3,0)
13	EM-601	Project Constraint and Risk Management	(3,0)
14	EM-599	Thesis	(3,0)

Note: Non-thesis option students will have to take additional courses and design project as per university policy.

CORE COURSES (COMPULSORY)

EM-501 Human Resource Management (3)

Human resource requirements of an organization, the strategic role of HRM, job analysis, personal planning and recruiting, employee testing and selection, interviewing candidates, training and development, performance management and appraisal, turnover analysis, theory of motivation and motivational tools, introduction to organizational behavior.

Recommended Books:

1. Human Resource Management by Gary Dessler, 10th Edition
2. Organizational Behavior by Ian Brooks, 4th Edition

EM-502 Operations Management (3)

The production/operations function and the organization, production/operations management as a strategic competitive weapon, social responsibility and sustainability, product design (goods and services, life cycle), process strategy, plant location and layout, variety and value, forecasting, inventory management, scheduling techniques, capacity planning, aggregate planning, supply chain management, case studies/research trends in operations management

Recommended Book:

1. “Operations Management: Sustainability and Supply Chain Management by Jay Heizer, Barry Render, Chuck Munson and Amit Sachan Twelfth Edition, Pearson © 2020

EM-503 Project Management (3)

Introduction to Projects: Overview of PMI and PMBOK, Classification of Projects, Common Problems, Phases of Project Life Cycle. People on Projects: Skills and Competencies, Project Term Structures, Authority & Responsibility, motivation. Project Overview Statement, Role of Joint Project Planning Sessions. Project Planning: Work Breakdown Structure, Estimation of Activity Durations, Network Relationships and Network Analysis, Project Scheduling and Resource Planning, Cost Planning, Risk Identification and Assessment. Project Monitoring and Control. Project closing.

Recommended Books:

1. Effective Project Management: Traditional, Agile, Extreme by Robert K. Wysocki, 5th Edition
2. “Project Management, A Managerial Approach” by Jack R. Meredith and Samuel J. Mantel, Jr. (Wiley)
3. “A Guide to the Project Management Body of Knowledge (PMBOK Guide)”, (PMI)

EM-504 Total Quality Management (3)

Introduction to quality management, quality control, quality assurance, TQM concepts and philosophies, leadership, customer satisfaction, employee involvement and team work, continuous process improvement, typical performance measures, quality costs, quality control tools, quality management systems, quality function deployment, quality by design, failure mode and effect analysis, total productive maintenance, future trends in TQM, TQM case studies.

Recommended Books:

1. TQM: Text with Cases by Jhon S. Oakland, 3rd Edition
2. Out of Crisis by W. Edward Deming
3. Total Quality Management by Besterfields, 3rd Edition

ELECTIVE COURSES (Any Four)

EM-505 Principles of Engineering Management (3)

Introduction to management. Evolution of management thought. Functions of management. External environment, social responsibility and ethics, planning fundamentals and management by objectives, strategies and policies. Decision making. Entrepreneurship and new venture creation. Organization structure, authority, empowerment and decentralization. Teamwork and communication, leadership and motivation. Change management.

Recommended Books:

1. Management: A Global and Entrepreneurial Perspective by Heinz Weihrich, Mark Cannice, Harold Koontz, 13th Edition
2. Griffin, R.W., "Management", AITBS Publishers, 5th Ed.
3. Dhillon, B.S., "Engineering Management", Technomic Publishing Company, 1993
4. Chang, C.M., "Engineering Management: Challenges in the New Millennium", Pearson Prentice Hall, 2005

EM-506 Economic Decisions in Engineering (3)

Concept of economic analysis, cost concepts, economic life cycle, supply and demand relationship, return to capital, interest and interest formulae, contemporary methods for economic analysis, comparing mutually exclusive alternatives, depreciation of assets, effect of taxes, replacement analysis, economic decision-making under risk and uncertainty, sensitivity analysis, benefit/cost ratio method, case studies, international trade and balance of payments.

Recommended Books:

1. Engineering Economy by William G. Sullivan, Elin M. Wicks (16th Edition)
2. Engineering Economy by Leland Blank, Anthony Tarquin (7th Edition)

EM-507 Environmental Management and Safety (3)

Introduction to environment and industrial systems, overview of hazardous wastes and regulatory agencies, characteristics of hazardous substances, associated hazards (toxicity, corrosiveness, reactivity, ignitability, radioactivity), concept of industrial hygiene, in-plant management & disposal of hazardous materials, work place safety (layout, material handling, pressure vessels, points of operation and maintenance, personal protection & means of controlling industrial fires), environmental protocols, air pollutants (terminology and definitions, control and treatment

methods), water pollutants (terminology and definitions, control and treatment methods), soil pollutants (terminology and definitions, control and treatment methods), environment impact assessment, economic aspects of environment & safety management, overview of environmental management systems

Recommended Books:

1. “Handbook of Industrial and Hazardous Wastes Treatment” edited by Lawrence K. Wang, Yung-Tse Hung, Howard H. Lo, Constantine Yapijakis(CRC Press)
2. “Safety Management” by John V. Grimaldi and Rollin H. Simonds (Richard D. Irwin, Inc.)

EM-508 Legal and Ethical Aspects in Engineering Management (3)

Legal principles and procedures of interest to engineers, Pakistani Legal System, Contacts and specifications, Liability, Agency relation, Patent and proprietary rights, Special problems in research and development, Case studies

Recommended Book:

1. The Management of Engineering: Human, Quality, Organizational, Legal and Ethical Aspects of Professional Practice by F. Lawrence Bennett, 4th Edition, Wiley

EM-509 Business Communications (3)

Communications Theories, Communication Problems, Environmental Analysis: Relationships, Goals, Values and Discriminations. Communication Objectives and Styles, Communicator’s Credibility. Audience Analysis and Audience Motivation. Thinking and Structuring Communications. Providing and Receiving Feedback. Business Writing. Nonverbal Communication. Preparation and Delivery of Presentations. Holding Meetings and Answering Questions.

Recommended Books:

1. Effective Business Communication by Herta A. Murphy, Herbert W. Hildebrandt, Jane P. Thomas, 7th Edition
2. Business Communication Today by Courtland L. Bovee, 10th Edition

EM-510 Industrial Marketing Management (3)

Introduction to the fundamental concepts of marketing, customer orientation, competition and core strengths, introductory finance, Marketing research and analysis, Marketing strategy, Implementation planning, Project, Process and supplier management, Market segmentation, product life cycle, distribution networks, social marketing, product promotions, Marketing Mix.

Recommended Books:

1. Marketing Management by Phil Kotler and Kevin Keller, 13th Edition, 2008, Prentice Hall

EM-511 Operations Research (3)

Introduction to operations research, linear programming, problem formulation, graphical solution, sensitivity analysis, integer programming, mixed integer linear programming, goal programming, transportation model, transshipment model, assignment model, network flow models, multi-criteria decision making techniques, decision analysis

Recommended Book:

1. Operations Research An Introduction by Hamdy A. Taha (8th Edition)

EM-512 Logistics and Supply Chain Management (3)

Introduction to supply chain operations, inventory management and risk pooling, network planning, supply chain contracts, the value of information, supply chain integration, distribution strategies, modes of transportation, inter-modal transportation, reverse logistics procurement and outsourcing strategies, coordinated product and supply chain design, customer value in supply chain, use of information technology in supply chain management, latest research trends and case studies in supply chain management

Recommended Books:

1. Designing and Managing the Supply Chain, By David Simchi-Levi and Philip Kaminsky and Edith Simchi-Levi, 3rd Edition, 2008
2. Operations and Supply Chain Management: The Core, by F. Robert Jacobs and Richard Chase, 4th Edition, 2017
3. Fundamentals of Supply Chain Management: An Essential Guide for 21st Century Managers by Kenneth B. Ackerman, 2007, ISBN: 0979597609
4. Supply Chain Management and Reverse Logistics by Harald Dyckhoff, Richard Lackes, Joachim Reese, Springer Science & Business Media Publishers, 2013, ISBN: 3540248153
5. Introduction to Supply Chain Management Technologies by David Frederick Ross, CRC Press, 2016
6. Logistics & Supply Chain Management by Martin Christopher, 5th Edition, Pearson Publisher UK, 2016, ISBN:1292083824

EM-513 Research Methodology in Engineering Management (3)

Introduction to research, definition and objectives of research, Types of research, Building blocks or research, Formulation and statement of problem, Theoretical framework, Hypothesis

development, Elements of research design, Data collection instruments, Data Analysis Techniques, Hypothesis testing, Inference, Dealing with the uncertainty in the data, Preparation of research report and presentation, Use of Minitab, MS Excel or some other software for statistical analysis, Reference styles used in research paper writing, Use of reference management software e.g. Endnote or Mendeley

Recommended Books:

1. Research Methodology: Methods and Techniques by C. R. Kothari, 2nd Edition

EM-514 Sustainability in Operations (3)

Fundamental concepts of sustainability, triple bottom line, UN sustainable development goals and relevant frameworks, design for sustainability aspects, life cycle assessment, end of life phases, 3Rs (reduce, reuse and recycle), logistics and reverse logistics, regulations and industry standards, research domains/case studies of sustainability in operations/manufacturing

Recommended Books:

1. Sustainable Manufacturing J P Davim Wiley 2010
2. Green Manufacturing: Fundamental and Applications. David Dornfeld Springer-Verlag, New York, US, 2013
3. Green Design and Manufacturing for Sustainability Nand K Jha CRC Press 2016

EM-515 Management Information Systems (3)

Introduction to MIS, Applications and Enablers, Role of Contemporary Hardware, Software and Networking Systems (Internet, Intranet and Extranet) and Techniques (Traditional and Cloud Computing) in Information Management Systems, Dimensions (Organization, Management and Technology), Integration of Elements of Information Management Systems (TPS, MIS, DSS, ESS), Enterprise Application Architecture for Harmonized Business Processes, Technological and Sociotechnical Aspects, Challenges and Outcomes for MIS, Framework for Information Systems, Key Considerations for Sustainable and Competitive MIS Strategies (Porter 5 Force Model, Value Chain Model, Value Web Model, Core Competencies and Network Economics) for Organizations.

Recommended Books:

1. Management Information Systems - Managing the Digital Firm by Kenneth C. Laudon & Jane P. Laudon (2018)

MF-502 Production Planning and Control (3)

Objectives of Production Planning and Control, Forecasting, Capacity Planning, Allocation of Resources, Resource Scheduling, Material and Inventory Management, Materials Requirement

Planning, Manufacturing Resource Planning, Enterprise Resource Planning, Just-in-Time Manufacturing

Recommended Books:

1. Manufacturing Planning and Control Systems by Thomas E. Vollmann, William L. Berry, D. Clay Whybark (2nd Edition)
2. Operations Management by Jay Heizer (12th Edition)

EM-601 Project Constraint and Risk Management (3)

Interaction of projects and operations, project selection and portfolio management, scope management, leadership in projects, project team building, conflict and negotiation. Work breakdown management structure and organizational breakdown structure. Crashing and cost minimizing. Resource loading and leveling, management of quality. Theory of constraints and critical chain management. Project risk management overview: establishment of context, planning for risk management, scope risks, schedule risks, recourse risks. Risk register and risk response planning.

Recommended Books:

1. Project Management for Engineering, Business and Technology By John M. Nicholas, Herman Styne, 4th Edition
2. Project Management: Achieving Competitive Advantage By Jaffery K. Pinto, Pearson Education, 2009
3. Identifying and Managing Project Risks by Tom Kendrick, 2nd Edition