



Department of Industrial &
Manufacturing Engineering,
NED University of Engineering
& Technology

Offers

MASTER DEGREE PROGRAMME

"Transform Knowledge into Impact..."

INDUSTRIAL MANAGEMENT

WEEKDAYS (Monday - Friday)

WEEKEND (Saturday & Sunday)

MASTER OF ENGINEERING
MANAGEMENT
(MEM)

ADMISSIONS
OPEN

CONTACT US

Dr. Ali Zulqarnain
(M. Engg. /MEM Coordinator)

Queries Assistance by Mr. Danish Khalil
(Executive Master's Programme)

Postgraduate Office, Department of
Industrial & Manufacturing Engineering,
NED University of Engineering & Technology,
Karachi-75270 ,

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Only Whatsapp Text 0334-3137166

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VISION



To be the Leader in the field of Industrial and Manufacturing Engineering, to produce High Quality Leaders and Managers for the industry.

MISSION



Aims to be the leading entity in the relevant field by High Quality Research, Education and Innovation to produce competent Human Resource, Capable of Performing Complex Task in an Environment Friendly and Socio-economic manner.

UN SDGS FOR THE BETTER PLANET



ABOUT THE DEPARTMENT



The Department was initially started under the auspices of Mechanical Engineering Department in October 1999 and started as a separate Department in October 2000 with the name of Industrial & Manufacturing Engineering Department (IMD).

The Department is offering Master of Engineering (by course work) with the Specializations in Manufacturing Engineering and Engineering Management. The Engineering Management program further offers choices of Specialization in (IM) Industrial Management (Weekdays & Weekend Programmes), Quality Management (QM), and Supply Chain Management (SCM). The Department of Industrial & Manufacturing Engineering has highly qualified and experienced regular and visiting faculty members.

"Your most Unhappy customers are, your greatest source of Learning"
(Bill Gates)

ABOUT THE PROGRAMME

AN INTRODUCTION

PROGRAMME MISSION

The mission of the programme is to create Technical and Managerial Expertise for Manufacturing and Service sectors, and Impart the Knowledge of Operations and Projects for Analysis, Design and Evaluation of Socio-technical Systems in the industry.

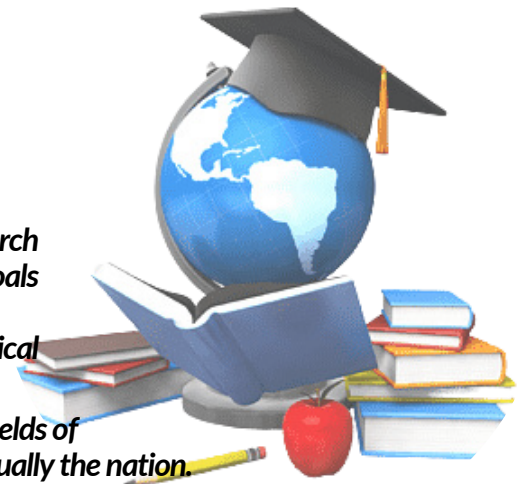


This programme is designed to equip students with advanced skills in managing and optimizing industrial processes. This program focuses on Strategic Planning, Project Management, and Organizational Leadership within the industrial sector. Students gain a deep understanding of Production Systems, Quality Management, and Supply Chain Integration. The curriculum combines theoretical knowledge with practical applications, fostering the development of critical Decision-making abilities.

This programme aims to provide businesses with competent employees who can propel success through strategic industrial and engineering management methods, not only to shape individual careers. Additionally, Professionals develop the abilities required for the Fourth Industrial Revolution (I4.0) and advance their careers in the dynamic sector of Industrial Management.

MEASURABLE PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

1. To develop necessary and advanced analytical, technical and research skills in the field of Engineering Management to fulfil the higher goals and needs of industry, academia and research.
2. To inculcate situational assessment and innovation for solving technical problems.
3. To develop an appetite for research and development in diversified fields of industrial engineering for progress of respective employer, and eventually the nation.
4. To develop skills for better work management and creative self-expression, disseminating knowledge and inculcating leadership.
5. To facilitate networking between the students to understand peers' technical issues, instill critical thinking and brainstorming, comprehend organizational systems to arrive at the solutions to socio-technical problems.
6. To develop university-industry collaboration through students who join graduate programme from different industries.



MEASURABLE PROGRAMME LEARNING OUTCOMES (PLOS)

- a) Development of engineering expertise in product design, tools and environment to fulfil industrial requirements.
- b) Application of knowledge based on analysis, synthesis and control of industrial and manufacturing operations employing statistical, calculus-based methods, simulation and information technology.
- c) Development of effective communication skills and meaningful contributions in graduate students while working in interdisciplinary teams with the understanding of economic, social and ethical impacts of decisions.
- d) Development of abilities to apply knowledge of applied sciences, management, computer-based technologies and principles of Industrial and Manufacturing Engineering.
- e) Development of abilities to identify and formulate problems and apply engineering science to technical problem solving.
- f) Understanding of social systems in operations management.
- g) Instilling skills to prepare financial analyses of projects, operations and firms.
- h) Inculcating ability to prepare technical reports, oral communication skills and knowledge of environmental issues in relation to technology.

"My definition of 'innovative' is providing value to the customer"
(Mary T. Barra, CEO of General Motors)

KEY BENEFITS

- **In-depth Knowledge:** Usually refers to a thorough comprehension of a range of topics pertaining to the efficient management and functioning of industrial organisations.
- **Strategic Design & Operational Solutions:** Complex Engineering Management problems that meet the specified needs of QM with appropriate consideration for public health and Safety, Cultural, Societal, and Environmental considerations.
- **Global Perspective:** To address the Challenges and Opportunities presented by the interconnected and diverse nature of the Global Business Environment.
- **Research & Analytical Skills:** By Incorporating Research Skills in IM, individuals could contribute to the Advancement and Sustainability of Management Practices within Organizations towards Operational Excellence.
- **Digital Transformation:** Equips individuals with the Knowledge and Skills needed to navigate the evolving landscape of IM in the era of Advanced Technologies.
- **Operational Excellence:** This knowledge is valuable for individual's future careers and contributes to building a Mindset that fosters Innovation, Productivity, and Success.
- **Any many more.....**



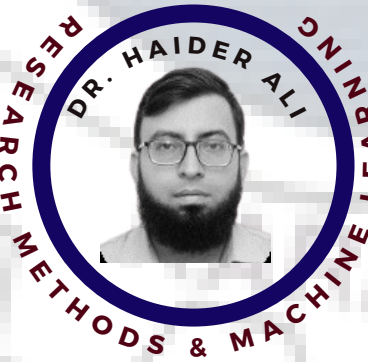
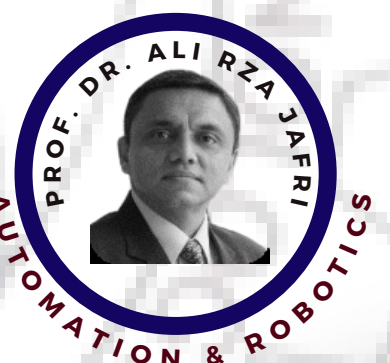
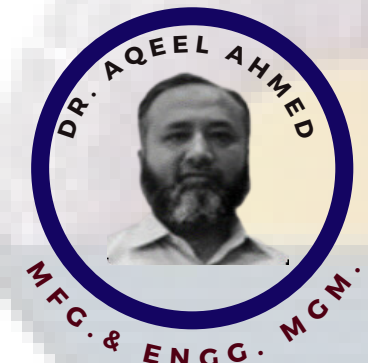
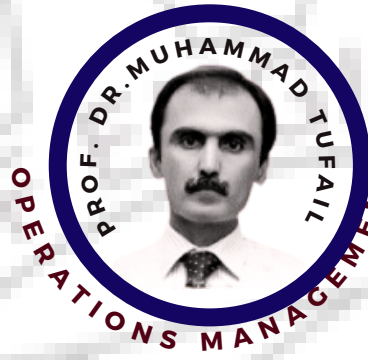
SALIENT FEATURES

- Programme is Recognized by HEC (NOC acquired).
 - Specialized Ph.D. Faculty / Industry Experts are engaged.
 - Case Study based Teaching.
 - Real-industry Scenario discussion.
 - Seminars/Guest Speakers by Field Experts.
 - Students are representing from Middle to Top Management.
 - Networking.
 - Guidelines for International Certifications.
 - Digital Library Facilities.
- Bachelor Degree in Industrial & Manufacturing Engineering / Biomedical Engineering or Allied Disciplines.
 - Open Enrollment through NED Academy: Enterprise Engineers who are committed to developing their IM competencies.

WHO SHOULD ATTEND

INTERNAL

A FEW FACULTY & EXPERTISE



- As Visiting Faculty, Industry Experts are also engaged in the Programme.

"The first step is to learn how to change"
(W. Edward Deming)

PROGRAMME OVERVIEW

Programme Length	1.5 YEARS	2.5 YEARS
Semester	03 Semesters Per Semester: 06 Months	05 Semesters Per Semester: 06 Months
Total Courses	10, (OR) 08 with Thesis	10, (OR) 08 with Thesis
Total Credit Hours	30	30
Courses/Semester	04 (1st Semester), 03 (2nd/3rd Semesters)	02
Class Schedule	<i>Flexible Timings</i> Saturday & Sunday Sat: 3pm-9pm, Sun: 9am-9pm	Monday - Friday 02 Days, 6:00 - 9:00pm

ADMISSION PROCEDURE

01

APPLICATION FORMS

Application Forms are available at university website under "Postgraduate Admission" and to be submitted in the concerned department.

ELIGIBILITY CRITERIA

Bachelor's Degree in Industrial & Manufacturing Engineering / Biomedical Engineering or Allied disciplines, 1st Division (Annual System) or at least with CGPA 2.40 / 4.0 (Semester System), Professional Bachelors Degree must be accredited by Pakistan Engineering Council (PEC) / Higher Education Commission (HEC).

02

03

PRE-ENTRY TEST

It will be held in concerned department.

INTERVIEW

Optional as per need.

04

05

FINAL LIST OF CANDIDATES

Display on departmental website and Notice Board.

CLASS COMMENCEMENT

Display on departmental website and Notice Board.

06

COURSE PLAN

COMPULSORY

(Per Course 3 Credit Hours)

- EM-501 Organisational Systems
- EM-502 Accounting and Financial Management
- EM-503 Strategic Planning & Decision Making
- EM-504 Project Management Framework & Tools
- EM-505 Operations Research



COMMON ELECTIVES

(Per Course 3 Credit Hours)

- EM-511 Total Quality Management:
- EM-512 Project Evaluation and Feasibility Analysis:
- EM-513 Research Methods in Engineering Management

ELECTIVES

(Per Course 3 Credit Hours, except mentioned)

- IM-501 Supply Chain Management
- IM-502 Computer Simulation Methods
- IM-503 Maintenance Management
- IM-505 Automated Manufacturing Systems
- IM-506 Business Process Reengineering
- IM-515 Agile & Lean Manufacturing
- IM-526 Facilities Planning and Layout
- ME-524 Reliability & Quality Engineering
- ME-527 Human Factors Engineering
- ME-529 Management Information Systems
- ME-542 Energy Management
- ME-546 Energy Planning
- ME-586 Health Safety & Environment
- SE-512 Research Methodology (0 Credit Hr)
- IM-5002 Thesis (6 Credit Hrs)



"Be a yardstick of quality. Some people aren't used to an environment where excellence is expected"
(Steve Jobs)

FEE STRUCTURE

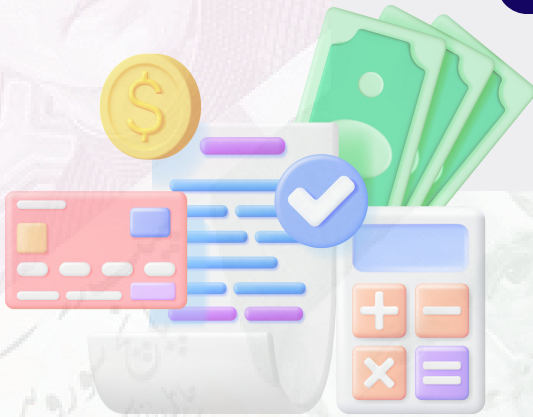
Fee Payable at the time of admission to the Programme

Admission / Re-admission Fee

(Enrolment fee (along with form fee)

Security Deposit

Documents Verification Fee



Fee Payable in each semester

Tuition & Examination Fee per Course

Library Fee

Registration Fee/Semester

Internet Fee

Late Fee, if applicable

Equivalence Fee, if applicable

University Endowment Fund

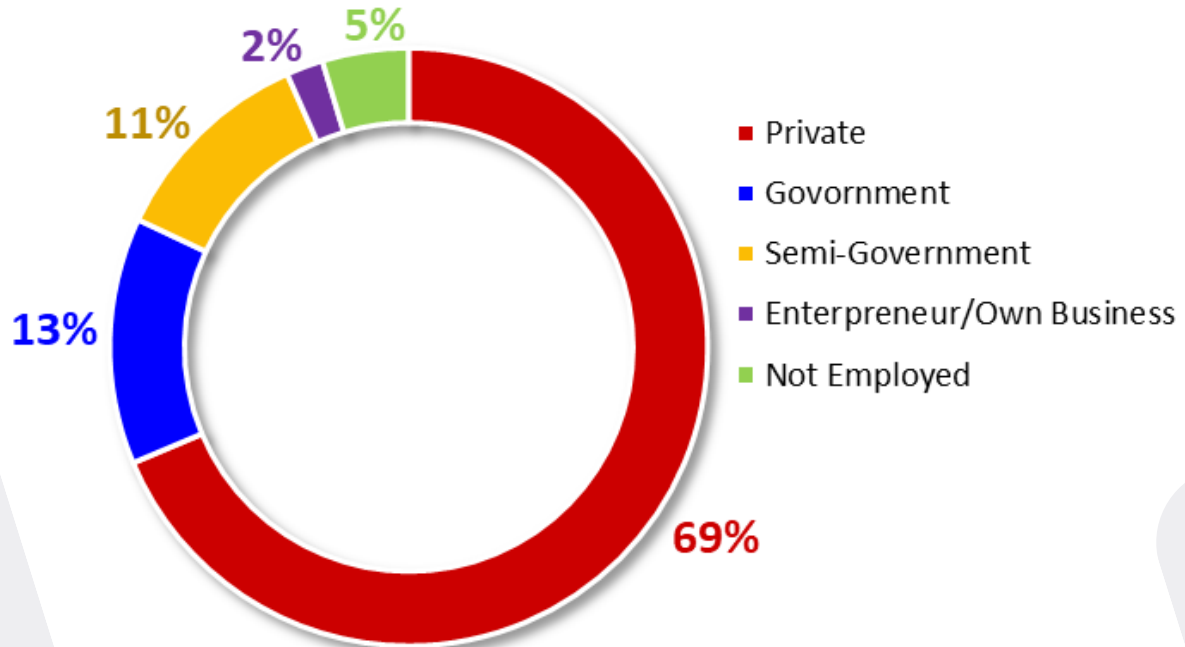
I-Grade Examinations Fee, if applicable



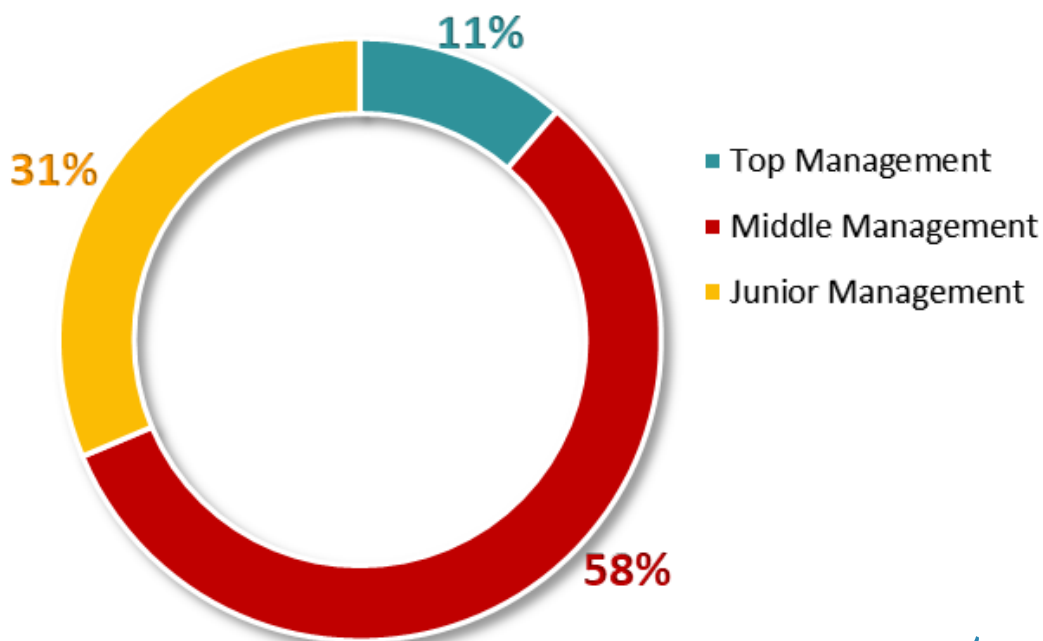
ACADEMIC CALENDER
Available at University
Website

ALUMNI / STUDENTS STATISTICS

Alumni/Students representation by Organisation



Alumni/Students representation by Level of Management

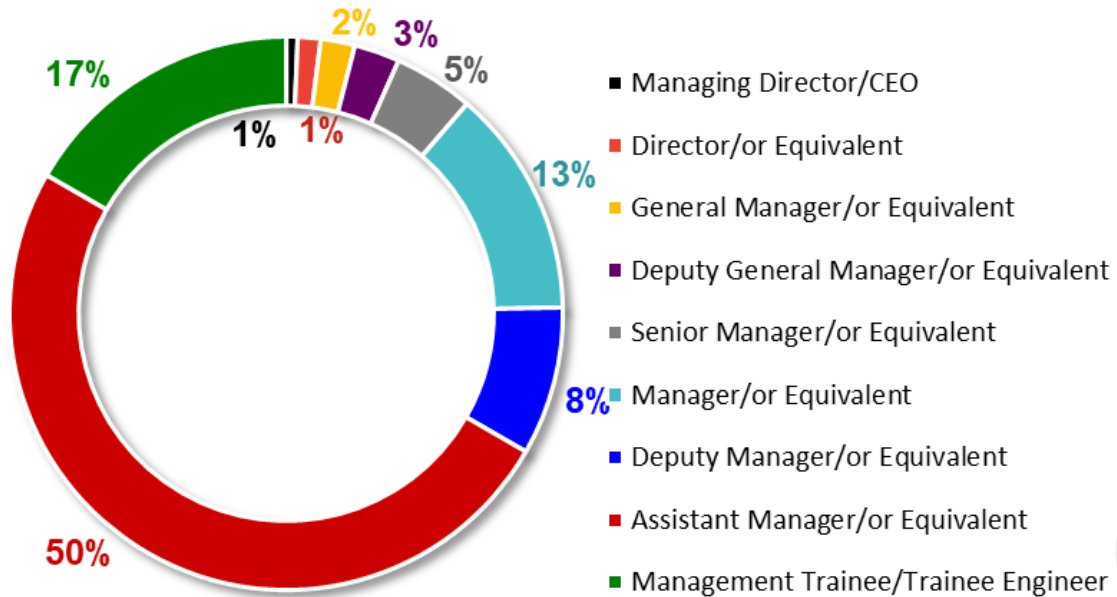


"There is one rule for the industrialist and that is: make the best quality of goods possible, at the lowest cost possible, paying the highest wages possible."
(Henry Ford)

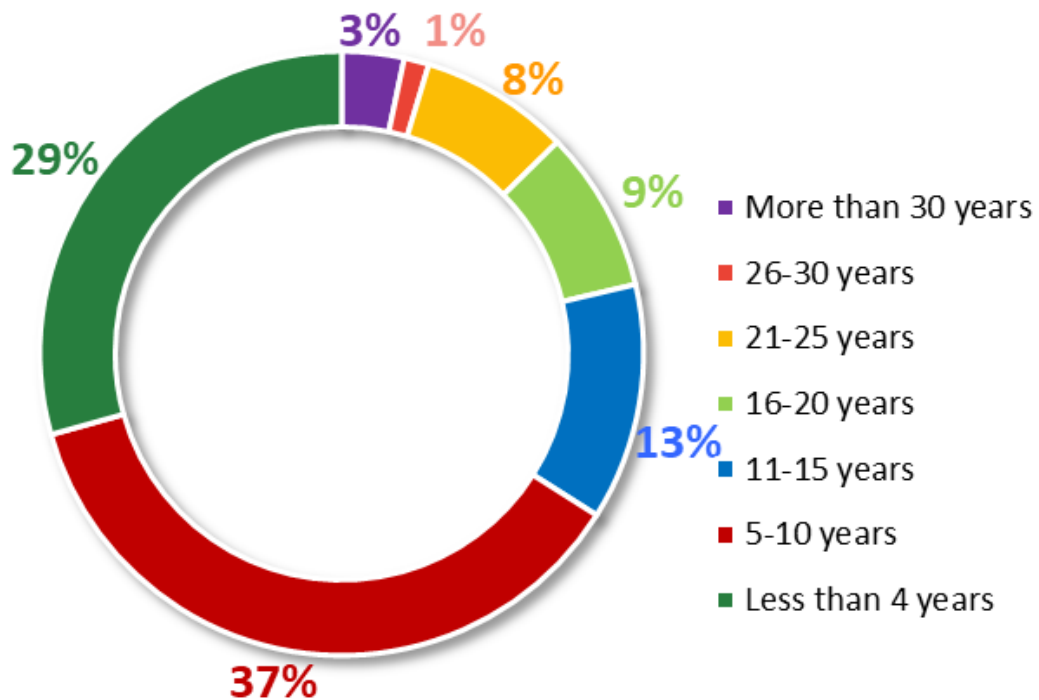
* Statistics is based on the Sampled Data from 1st batch to present

ALUMNI STATISTICS

Alumni/Students representation by Designation



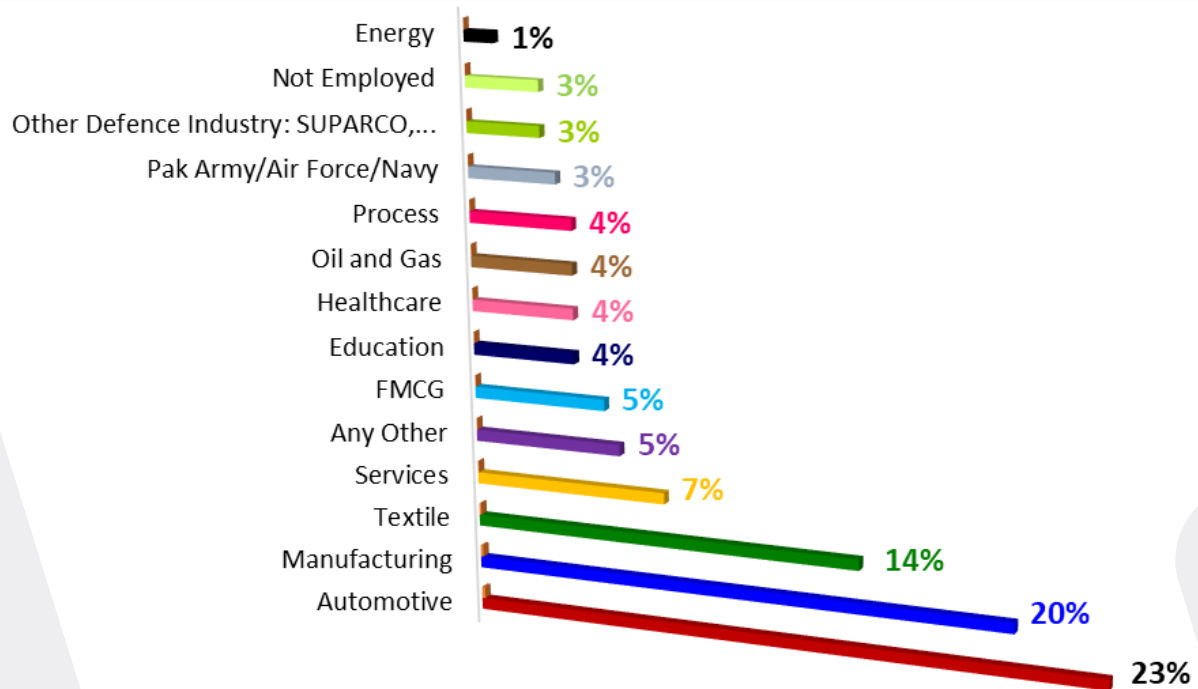
Alumni/Students representation by Field Experience



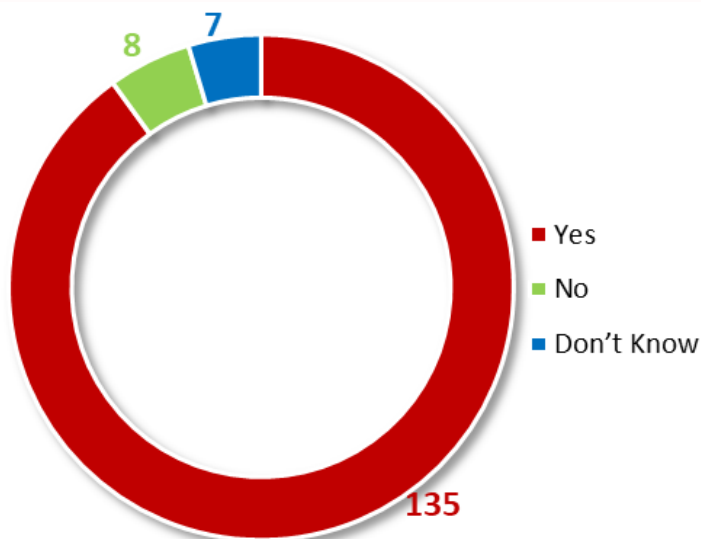
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ALUMNI STATISTICS

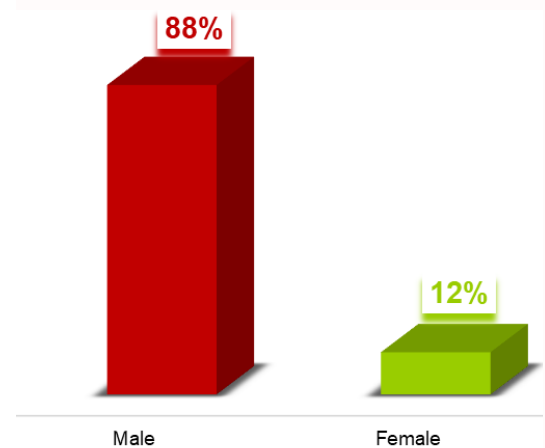
Alumni/Students representation by Types of Organisation



Alumni/Students representation by Recommendation for IMD Master Degree Prog.



Male/Female Ratio



"One of the only ways to get out of a tight box is to invent your way out"
(Jeff Bezos)

TESTIMONIALS

” **KASHIF RAHIM** *General Manager Indus Motor Company Limited*

Enrolling in the industrial and management master's degree program, it was an immensely rewarding experience. The rigorous curriculum not only provided a profound understanding of industrial processes but also equipped me with advanced management skills crucial for today's dynamic business landscape. The faculty, and experts in their respective fields, fostered an environment of intellectual curiosity and encouraged practical application of theoretical concepts. Overall, this master's program has been instrumental in shaping my holistic understanding of industrial processes and management practices, providing a solid foundation for a successful and fulfilling career in the field.

“

” **KHAN ASIF KAMAL** *Dy. General Manager - AEWL*

I'm thinking of making a career boost and the NED University Master Degree Programme helps. NED University of Engineering & Technology is one of the oldest and most prestigious engineering institutions in Pakistan. It gives the skills and knowledge to design, develop, implement, and improve Manufacturing Systems and processes in the industry. Not only but also to have the ability to apply ethical and professional standards. The faculty are knowledgeable and supportive. I am very satisfied with M. Engg. Programme and I think it is worth the investment.

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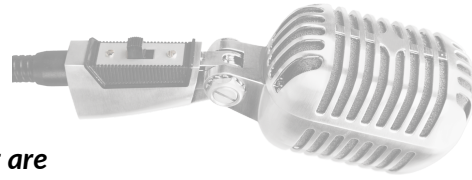
” **ZUBAIR AHMED** *Manager Tecno Pack Industries*

I completed my master's degree program and I can confidently say that it was one of the best decisions of my life because after completion I was promoted to a manager position and also assigned the role of Management Representative for the organization. The program offered me a comprehensive and rigorous curriculum that covered both theoretical and practical aspects of the field. The faculty members were highly qualified and experienced, and they always encouraged me to explore new ideas and challenge myself. The program also provided me with ample opportunities to work on real-world projects, collaborate with industry partners, and network with peers and mentors. I learned a lot from the program and I feel well-prepared for my future career. I would highly recommend this program to anyone who wants to pursue a master's degree in Quality Management who is working in any automotive or manufacturing organization

“

GUEST SPEAKER SESSIONS

Few of them latest are



SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Dr. Haider Anwar
 Associate Professor
 Mechanical Engineering Department

TOPIC: "RESEARCH METHODS
 IN ENGINEERING MANAGEMENT"

DATE: Sunday 24th December 2023
 TIME: 10:00 AM - 11:30 AM

ORGANISED BY
 Department of Industrial & Manufacturing Engineering
 Subject: Total Quality Management

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Syed Haseeb Hassan
 Sales Manager - EM Charging Infrastructure
 ABIB E-mobility GmbH, Germany

TOPIC: PRODUCT &
 VALUE CREATION

DATE: Tuesday 19th December 2023
 TIME: 7:00 PM - 8:00 PM

ORGANISED BY
 Prof. Dr. Ing. Mushtaqul Hassan Hashim in coordination with
 The Department of Industrial & Manufacturing Engineering
 Subject: New Product & Service Development Management

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Mr. Khurshad Iqbal
 SITE Director
 GlaxoSmithKline

TOPIC: HEALTHY &
 SAFETY & ENVIRONMENT

DATE: Tuesday 19th December 2023
 TIME: 7:00 PM - 8:30 PM

ORGANISED BY
 Department of Industrial & Manufacturing Engineering
 Subject: Health, Safety and Environment

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Dr. Sharfuddin Ahmed Khan
 Assistant Professor
 University of Regina, Canada

TOPIC: DIGITALIZATION AND SUPPLY CHAIN MANAGEMENT:
 BENEFITS, CHALLENGES AND OPPORTUNITIES

DATE: Friday 29th December 2023
 TIME: 8:00 PM - 9:00 PM

ORGANISED BY
 Department of Industrial & Manufacturing Engineering
 Subject: Supply Chain Management

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Syed Saad Anwar
 Head of Business Development
 Lucely Water Corporation

TOPIC: "STRATEGIC PLANNING
 & DECISION MAKING"

DATE: Friday 22nd December 2023
 TIME: 7:00 PM - 8:30 PM

ORGANISED BY
 Department of Industrial & Manufacturing Engineering
 Subject: Strategic Planning & Decision Making

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Muhammad Azam
 Senior Manager Operational Excellence
 +92-338-88-1945

TOPIC: "LEAN MANUFACTURING &
 IMPLEMENTATION CHALLENGES"

DATE: Friday 22nd December 2023
 TIME: 7:00 PM - 8:30 PM

ORGANISED BY
 Department of Industrial & Manufacturing Engineering
 Subject: Agile & Lean Manufacturing

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Mr. Ahmed Saad Quresh
 Manager Outsourcing
 HBI

TOPIC: LOGISTICS
 MANAGEMENT

DATE: Wednesday 20th December 2023
 TIME: 7:00 PM - 8:30 PM

ORGANISED BY
 Department of Industrial & Manufacturing Engineering
 Subject: Logistics Management

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Taha Bin Mehmood
 Principal Engineer - Solution Engineer
 Octopus Digital

TOPIC: MAINTENANCE MANAGEMENT

DATE: Wednesday 20th December 2023
 TIME: 6:30 PM - 8:00 PM

ORGANISED BY
 Department of Industrial & Manufacturing Engineering
 Subject: Maintenance Management

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Mr. Hassan Ahmed Memon
 Manager Strategy and Plan
 EasyPos - Telecom, Micro, Fintech

TOPIC: THE IMPORTANCE
 OF MARKETING FOR ENGINEERS!

DATE: Thursday 24th December 2023
 TIME: 7:00 PM - 8:30 PM

ORGANISED BY
 Mr. Yusuf Ali Mehmood in coordination with
 The Department of Industrial & Manufacturing Engineering
 Subject: Principles of Marketing

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Syed Muhammad Osama Iqbal
 Executive Manager Planning
 Hiral Foods Limit

TOPIC: SUPPLY CHAIN
 MANAGEMENT

DATE: Sunday 24th December 2023
 TIME: 3:00 PM - 4:30 PM

ORGANISED BY
 Department of Industrial & Manufacturing Engineering
 Subject: Supply Chain Management

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Abdullah Ansari
 Operational Technology Manager
 Pfizer, Australia

TOPIC: PROJECT MANAGEMENT

DATE: Thursday 28th December 2023
 TIME: 7:30 PM - 9:00 PM

ORGANISED BY
 Department of Industrial & Manufacturing Engineering
 Subject: Project Management

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Mr. Nisar Ahmed Soomro

TOPIC: "INCOME TAX
 PRINCIPLES & PRACTICES"

DATE: 9th December 2023
 TIME: 6:30 - 09:00 PM

ORGANISED BY
 Mr. Saqar Uddin in coordination with the Department of
 Accounting & Financial Management

SESSION ON GUEST **SPEAKER**
 Series of Guest Speaker Sessions
 Master Degree Programmes
 FALL

By Dr. Sharfuddin Ahmed Khan
 Assistant Professor
 University of Regina, Canada

TOPIC: DEVELOPMENT OF A QUALITY PAPER
 AND HOW TO PUBLISH IN TOP JOURNAL

DATE: Saturday 23rd December 2023
 TIME: 8:00 PM - 9:00 PM

ORGANISED BY
 Department of Industrial & Manufacturing Engineering
 Subject: Research Methods in Engineering Management

"Improvement usually means
 doing something that we have
 never done before"
 (Shigeo Shingo)

CONTENTS OF COURSES

COMPULSORY:

EM 501 Organizational Systems: Definitions of management; Evolution of management thought, classical, quantitative and behavioral schools; interactions between organizations and their environments. The planning process; strategic and tactical planning, developing planning premises, nature of managerial decision making, quantitative aids, management by objectives. Organizational structures; behavior of the individual, work group, and organization; coordination and spans of control, the informal organization; authority delegation and decentralization, groups and committees, managing organizational change and conflict. Motivation, performance and satisfaction; building a high-performance team; leadership, interpersonal and organizational communication, staffing and personal function. The control process; budgetary and non-budgetary methods of control; team performance measurement and improvement strategies. Use of management information systems.

EM 502 Accounting and Financial Management: Foundations of finance with applications in corporate finance and investment management. Major financial decisions made by corporate managers and investors with focus on process valuation. Criteria for investment decisions, valuation of financial assets and liabilities, relationships between risks and return, market efficiency, and the valuation of derivative securities. Major corporate financial instruments including debt, equity and convertible securities. Analysis and projection of financial statements, cost elements in pricing, cost control and design of accounting systems.

EM 503 Strategic Planning and Decision Making: Critical issues in shaping the competitive strategy for engineering-driven companies in a turbulent business environment; corporate mission; key result areas and situational analysis including strengths, weaknesses, opportunities and threats; identifying planning assumptions, critical issues, setting objectives, formulating strategy. Managing technology as a strategic resource of the firm; understanding of the process, roles and rewards of technological innovation; integrating the strategic relationship of technology with strategic planning, marketing, finance, engineering and manufacturing; government, societal and international issues; issues pertaining to cultural diversity and ethical concerns. Subjective, judgmental and expert decisions; conflict resolution in strategic decisions involving technological alternatives; hierarchical decision modeling; individual and aggregate decisions; decision discrepancies and evaluation of group disagreements.

EM 504 Project Management Framework and Tools: Role of projects in organization's competitive strategy; Standard methodologies for managing projects; Project life cycle; Design-implementation interface; Estimating: preliminary and detailed; Contractual risk allocation; Scheduling: PBS; WBS; Integration of scope, time, resource and cost dimensions of a project; Evaluation of labor, material, equipment, and subcontract resources; Scheduling techniques including CPM/ PERT, GERT, critical chain; Solving real-world project schedules; Monte Carlo simulation; Cost budgeting; Cost baseline; Cash flow analysis; Earned value analysis; Cost control; Proposal presentation; Application of software for project management (MS Project, Primavera Project Planner-P3).

EM 505 Operations Research: Deterministic Modeling; Linear programming; The Simplex method; Multiple objective linear optimization; Duality and sensitivity analysis; Post optimality analysis from the viewpoint of technology management; Transportation, transshipment, and assignment problems; Problem formulation; Goal programming; Network analysis; Dynamic programming; Integer programming and nonlinear programming. Probabilistic modeling: Markov chains; Queuing theory and applications; Inventory theory; Forecasting; Design analysis and simulation; Pareto optimality and tradeoff curves.

CONTENTS OF COURSES

COMMON ELECTIVES:

EM 511 Total Quality Management: Critical principles and procedures of quality management in a competitive global environment; contemporary definitions of quality; construction quality; Product quality; Process quality; Quality economics; Quality philosophies; Planning, organizing and controlling for quality; Human resource strategies; QA and QC tools.

EM 512 Project Evaluation and Feasibility Analysis: Evaluation of engineering projects from the engineering management perspective; Techniques for capital investment for decision-making; Time value of money and the concept of equivalence; Present worth, annual and rate of return analysis; Multiple alternatives; Replacement criteria; Tax considerations; Breakeven sensitivity analysis; Project evaluations under uncertainty; Risk sharing; Capital budgeting; Cost of capital depreciation; Multicriteria decisions. Project feasibility analysis; Organizational impacts; societal impacts; Environmental impacts.

EM 513 Research Methods in Engineering Management: Research methods in engineering and technology management; Statistical techniques including proper selection; Use and interpretation of parametric and non-parametric tests along with factor and discriminate analysis; Design of experiments and model misspecification; Simulation in engineering and management research and practice.

ELECTIVES:

IM 501 Supply Chain Management: Management systems for distribution, materials handling, inventory control, transportation planning and facilities location and analysis; Logistics information systems and development of logistics strategy. Use of planning models and software packages to demonstrate concepts of strategic partnering, adequate safety stock levels, and risk pooling. Integrated decision support systems in the management of the supply chain and logistics network design issues.

IM 502 Computer Simulation Methods: The objective and purpose of simulation, its advantages and limitations. Process view of discrete manufacturing and business systems involving inputs, activities, and outputs; structure; and metrics. Identification of decision variables; uncontrollable variables, and dependent variables for strategic and operational level decisions. Modeling of industrial systems using dynamic simulation environments, and analysis of alternatives using statistical techniques and animation. Applications to include production systems, inventory management, transportation and supply chain, business process re-engineering, and public systems.

IM 503 Maintenance Management: Typical maintenance responsibilities; Types of maintenance: Breakdown Maintenance, Preventive Maintenance, Individual Versus Group Replacement, Internal Versus External Maintenance; Determination of Crew size. Queuing Theory Application in Maintenance: Input, Queue, Service Characteristics. Mathematical Approach; Monte Carlo Simulation, Computerized Maintenance Management.

"Watch the little things; a small leak will sink a great ship"
(Benjamin Franklin)

CONTENTS OF COURSES

IM 505 Automated Manufacturing Systems: Automated flow lines; Methods of work part transport; Transfer mechanism; Buffer storage; Control functions; Automation for machining operations; Design and fabrication considerations; General terminology and analysis; Analysis of transfer lines without storage; Partial automation; Automated flow lines with storage buffers; Computer simulation of automated flow lines. The assembly process; Assembly systems; Manual assembly lines; The line balancing problem; Methods of line balancing; Computerized line balancing methods; Flexible manual assembly lines; Types of automated assembly systems; Parts feeding devices; Analysis of multi-station assembly machines; Analysis of a single station assembly machine. Schemes for Concurrent Engineering: Axiomatic Design, DFM Guidelines, Design for Assembly, The Taguchi Method for Robust Design, Manufacturing Process Design Rules, Computer-Aided DFM, Group Technology; Failure-Mode and Effects Analysis. Robot motions, Robot drive power, Types of robots; Robot motions: Link geometries, Frame of reference, Orientation, Changing frames of reference, Workspace Descriptions; Robot accuracy and repeatability; Economic justification of Robots; Characteristics of robot applications; Robot Cell design; Types of robot applications, Material handling applications; Processing applications; Assembly & inspection.

IM 506 Business Process Reengineering: Fundamentals of process management; importance of process decisions and process choices; strategic process decisions for manufacturing and service environments. Costs, quality, and timeliness as the primary attributes of value; creation of value through strategies and processes. Process improvement tools and frameworks; process maps, value stream mapping, service blueprinting, reengineering, Poka-Yoke, lean systems and six-sigma. Simulation and modeling of discrete event systems and processes; random numbers generation, Monte-Carlo simulation, and probability distributions for discrete event processes. Implementing BPR methodology; initiating organizational change; building the reengineering organization; identifying BPR opportunities, understanding existing processes, reengineering processes, blueprinting new business systems, performing transformation.

IM 515 Agile and Lean Manufacturing: Introduction to Lean Manufacturing, value concept, lean objectives & tools, origins of lean systems, group technology, 5S, single minute exchange of dies, total productive maintenance, Kaizen, Just-In-Time Manufacturing Systems, Push & Pull Manufacturing Systems, Poka-Yoke, Toyota production system, introduction to agile manufacturing, research projects in agile manufacturing, design of market responsive supply and distributions manufacturing systems.

IM 526 Facilities Planning and Layout: Introduction to Product and Process Design, process planning and sequencing; manufacturing processes: automation with respect to sensing equipment and control systems; manufacturing systems: fixed and flexible manufacturing systems, single-stage multi-machines systems, Just in time and group technology approach; requirements and selection of machines and labour, building, organization, communications and support requirements; material handling principles: equipment and its selection criteria, flow lines, grouping, packaging, storage and warehousing, plant and office layout: conventional approaches, flow space and activity relationships, computerized layout planning models and algorithms, computer aided process planning, operation sequence and path planning with constraints, case studies in CAPP, simultaneous development of plant layout and material handling systems, basic facility location problems, single- and multiple facility placement problems, heuristics and computerized approaches.

CONTENTS OF COURSES

ME 524 Reliability & Quality Engineering: Reliability Measures: The reliability function; expected life; failure rate and hazard function; reliability and hazard function for well known distributions such as exponential; normal, log normal, Weibull, and gamma distributions; hazard models and product life; constant hazard function, linearly increasing hazard function, piecewise linear bathtub hazard function, power function model, exponential model. Static Reliability Model: Series system, parallel system, series & parallel combinations, complex system analysis, reliability considerations in design. Reliability Engineering Design: Reliability design methodology, strength and stress distributions, safety factors and reliability, reliability bounds in probabilistic design. Transformation of random variables. Sums and differences of normal random variables, error analysis, statistical tolerancing. Interference Theory and Reliability Computations: General expression for reliability; reliability computations for normally, log normally, exponentially, Gamma and Weibully distributed stress and strength; reliability design examples. Reliability in Design and Testing: Dynamic reliability models, reliability estimation, sequential life testing, Bayesian reliability in design and testing, reliability optimization. Control Charts: Properties of the distribution of sample means, sample range estimation of standard deviation, chance and assignable causes, control charts for mean & range, control charts for mean & standard deviation, control charts for proportion defective & defects per assembly. Tests of significance to compute confidence limits. Acceptance Sampling: Introduction, OC curve, consumer & producer risks, AQL & LTPD, Acceptance Sampling for continuous production, Acceptance by Variables, Single, Double, & Sequential Sampling. Quality, Reliability, & Maintainability: Definitions, management of quality control, economic aspects of quality decisions, capability & variability analysis, various aspects of life testing, reliability, & maintainability, Introduction to ISO 9000, and ISO 14000.

ME 527 Human Factor Engineering: Introduction: Scope of ergonomics, human operator as system components; physical size and shape dynamics, Anthropometry, sources and application of energy input sensitivity, central processing capacity, input characteristics, environmental effects, heat and vibration, lightning and noise. Techniques in human factor studies; the assessment of physical activity, subjective assessment technique, methods of work analysis. Design Requirements: Interface design; space requirements and layout visual presentation of information, auditing presentation of information, machine dynamics, control design, environmental factors, jobs aids, System evaluation.

ME 529 Management Information Systems: Management Information System Concepts: What a System is, Information System Defined, Computer Based Information System, Functions of an Information System, Manager and information needs, the role of managers, management levels and information needs. Types of Information Systems: Transaction processing systems, management information systems, decision support systems, executive support systems. The System Development Life Cycle: Reasons to develop new information systems, system analysis, problem definition, requirements analysis, project justification, system analysis tools, system design, logical design stage, system design tools, prototyping and its effects on the system development life cycle, automating system analysis and design, system implementation, testing and installation stage, training stage, and system maintenance. File and Database Processing: File processing, file management systems, database processing, database management systems, database models: the hierarchical model, the network model, the relational model, object-oriented model, database design considerations. Managing database: distributed databases, knowledge-based systems. Expert system shells, knowledge engineering, uses of knowledge-based systems.

"The thing I have learned at IBM is that culture is everything"
 (Louis V. Gerstner, Jr., former CEO of IBM)

CONTENTS OF COURSES

ME-542 Energy Management: Introduction; The role of energy manager. Attitudes to energy efficiency, the objective of energy management, priorities, and strategies. Control Units; Plant control, Burner control unit, compensator and optimiser, control and use of an energy management system. Monitoring; Remote monitoring and out-station operation, degree days performance lines and targeting, Audits, Environmental, energy and social. Energy Modeling & Forecasting; Data on energy resources, and reserves and relation of resources to future options. Energy demand models prices and elasticities, concepts of economic growth, energy gap concepts, operation research techniques in energy modeling. Energy Transmission & Utilization; Quality and economics criteria in selection of energy equipment and processes. Waste Heat Recovery System; Thermal wheels, heat pipes, turbo expanders, heat pumps and the co-generation of heat and power for both heating and cooling systems. Design and balance of total energy systems. Energy Resources; Fossil and derived fuels, exploration and production techniques. Renewal fuels, solar radiation wind power, wave and tidal energy, bio-fuels, geo-thermal, refuse driven. Solar Energy Conversion Systems; Solar energy and its conversion for use of society, fundamentals of solar radiation, solar collection and thermal conversion systems. Components, economics of solar power.

ME-546 Energy Planning: Energy Economics and Planning; Energy economics. The nature and causes of the energy problems. The magnitude of the problems: present and future. Demand-side issues: determinants; interfuel substitution. Supply-side issues: commercial energy determinants; traditional energy determinants; externalities. Policy issues: pricing policies; distribution issues; energy balances; formulation and execution. National energy statistics; Definitions of primary, secondary, delivered and useful energy. Problems of interpolation and comparison of energy statistics. Rural Energy Planning; Patterns of energy demand and supply. Socioeconomic aspects of energy use. Survey methods. Identifying potential solution to needs. Matching solutions to needs. Project planning, monitoring and evaluation. Financial Evaluation Projects; Project analysis and financial appraisal: discounted cash flow. concept of time preference discount rates. Inflation and interest rates. Project evaluation in terms of present values and internal.

ME-586 Health, Safety and Environment: Safety management, OSHA protection program, management systems, equipment safety, fire protection and life safety, combustion and flammability, process and system safety, system reliability, material handling, operations safety, construction safety, chemical hazard assessment, material safety datasheets, exposure limits, hazard communication, personal protective equipment, industrial ventilation, radiation safety, sound and hearing conservation. Types of pollution and prevention, Air emissions modeling, air sampling methods, waste treatment (physical, chemical, biological thermal types) and disposal technologies, wastewater and water treatment, water quality standards, water discharge limitations and standards, pretreatment regulations, storage and containment.

SE-512 Research Methodology (0 Credit Hr)

IM-5002 Thesis (6 Credit Hrs)

"An idiot with a plan can beat a genius without a plan"
(Warren Buffett)