

MSc Industrial Engineering & Management - E541

1. Aims and Objectives

This Programme has been specifically designed to equip graduates with problem-solving, technical and managerial skills and knowledge related to Industrial Engineering and Management and to prepare them for professional careers in managing manufacturing, engineering and other technologically oriented services.

Graduates from this Programme should develop:

- a thorough understanding of the principles and technology related to Engineering and manufacturing services;
- in-depth knowledge of Industrial Engineering and Industrial Management concepts and techniques and the ability to apply these techniques in designing and managing manufacturing, engineering and other services;
- the ability to conceptualise, analyse, synthesise and implement industrial systems and services; and
- efficiently manage manufacturing, engineering and other technology-oriented systems.

2. General Entry Requirements

Successful completion of an undergraduate degree with

- at least a Second Class or 50%, whichever is applicable or
- a GPA not less than 2.5 out of 4 or equivalent, from a recognised higher education institution.

OR alternative qualifications acceptable to the University of Mauritius.

3. Programme Requirements

- (i) At least a Second Class Honours Degree in Science, Engineering, Agriculture/Agriculture related subjects, Management or an equivalent qualification acceptable to Senate.
- (ii) Preference will be given to candidates with relevant work experience.

4. General and Programme Requirements – Special Cases

The following may be deemed to have satisfied the General and Programme requirements for admission:

- (i) Applicants who do not satisfy any of the requirements as per Regulations 2 and 3 above but who submit satisfactory evidence of having passed examinations which are deemed by the Senate to be equivalent to any of those listed.
- (ii) Applicants who do not satisfy any of the requirements as per Regulations 2 and 3 above but who in the opinion of Senate submit satisfactory evidence of the capacity and attainments requisite to enable them to pursue the programme proposed.
- (iii) Applicants who hold a full practising professional qualification obtained by examination.

5. Programme Duration

The Programme will be offered on a part-time basis. The duration of the Graduate Programme should normally not exceed 4 years (8 semesters).

	Normal	Maximum
Master's Degree:	4 Semesters	8 Semesters
Postgraduate Diploma:	4 Semesters	8 Semesters
Postgraduate Certificate:	2 Semesters	8 Semesters

6. **Credits per Semester:** Minimum 3 credits subject to Regulation 5.

7. Minimum Credits Required for the Award of

Master's Degree:	36
Postgraduate Diploma:	24
Postgraduate Certificate:	12

Breakdown as follows:

	Core Taught Modules (Minimum)	Project	Electives/ Optional Modules
Master's Degree:	18 credits	9 credits	9 credits
Postgraduate Diploma:	18 credits		6 credits
Postgraduate Certificate:	12 credits		

8. Assessment

Students are required to register for modules which they intend to follow in a given semester on date(s) specified by the Faculty.

Each module will carry 100 marks and will be assessed as follows (unless otherwise specified):

Written examination of 3-hour duration and continuous assessment of 10% to 30% of total marks.

Continuous assessment may be based on laboratory work, seminars, and/or assignments and should include at least one class test.

For a student to pass a module, a minimum of 30% should be attained in both of Continuous Assessment and Written Examination separately, with an overall total of a minimum of 40% in that module.

All modules carry equal weighting.

The Project carries 9 credits.

Submission Deadlines for Dissertation:

- First Draft: End of July of Final Year.
- Final Copy: Last working day of August of Final Year.

9. Plan of Study

Students are required to submit at the end of Semester 1 a Plan of Study for their whole Programme of Studies, indicating the list of elective modules and in which semester each of them will be taken.

The University reserves the right not to offer a given elective module if the critical number of students is not attained and/or for reasons of resource constraints.

The Faculty reserves the right to change the order in which the modules are offered.

10. Important Note

The rules as stipulated in this Programme Structure and Outline Syllabus will replace all other rules and regulations found in previous Programme Structures.

11. List of Modules

Code	Module Name	Hrs/Wk L+P	Credits
<u>CORE MODULES</u>			
MECH 6306	Production and Operations Management	3+0	3
MECH 6102	Design of Manufacturing Systems	3+0	3
MECH 6103	Industrial Systems Analysis	3+0	3
ENGG 6202	Research Methods	3+0	3
MECH 6101	Managing Quality	3+0	3
MGT 5212	Human Resources and Quality Management	3+0	3
<u>PROJECT</u>			
ENGG 6000	Project	-	9
<u>ELECTIVES</u>			
ENGINEERING ELECTIVES			
MECH 6409	Maintenance Management	3+0	3
MECH 6407	Occupational Safety	3+0	3
MECH 6406	Computer Integrated Manufacturing Systems	3+0	3
MECH 6410	Energy Management	3+0	3
MECH 6408	Operations Research	3+0	3
MECH 6201	Quality Systems & Auditing	3+0	3
CIVE 6102	Environmental Management 1	3+0	3
CSE 6005	Management Information Systems	3+0	3
ENGG 6410	Asset Management	3+0	3
MANAGEMENT ELECTIVES			
ACT 5112	Project Economics & Finance	3+0	3
MGT 5282	Strategic Management for Executives	3+0	3
MGT 5109	Employment Laws	3+0	3
MGT 6115	Business-to-Business Marketing	3+0	3
MGT 6180	Managing Human Resources	3+0	3
MGT 6211	Business Ethics and Corporate Governance	3+0	3

12. Programme Plan - MSc Industrial Engineering & Management

YEAR 1							
Semester 1				Semester 2			
Code	Module Name	Hrs/Wk L+P	Credits	Code	Module Name	Hrs/Wk L+P	Credits
CORE				CORE			
MECH 6306	Production and Operations Management	3+0	3	MECH 6102	Design of Manufacturing Systems	3+0	3
MGT 5212	Human Resources and Quality Management	3+0	3	ENGG 6202	Research Methods	3+0	3
				MECH 6103	Industrial Systems Analysis	3+0	3
YEAR 2							
Semester 1				Semester 2			
Code	Module Name	Hrs/Wk L+P	Credits	Code	Module Name	Hrs/Wk L+P	Credits
CORE				CORE			
ENGG 6000	Project	-	-	ENGG 6000	Project	-	9
MECH 6101	Managing Quality	3+0	3				
ELECTIVES				ELECTIVES			
	One Engineering Elective Module	3+0	3		One Management Elective Module	3+0	3
					One Engineering Elective Module	3+0	3

NOTE:

Each module will consist of 45 contact hours (this includes lectures, tutorials, seminars, workshops, external visits, etc.). The total contact (taught) hours of the Programme therefore will be 405 hours. The Project will involve 180 working hours including direct supervision by a member of academic staff and/or an external supervisor.

A minimum of 6 contact hours is scheduled per week (3 hours on a weekday and 3 hours on Saturday). However, candidates are expected to attend daily normally after 4.00 p.m., for intensive modules taught in a period of two weeks by visiting lecturers.

13. Outline Syllabus

ACT 5112 - PROJECT ECONOMICS AND FINANCE

Introduction to the Mauritian Economy - Major Projects in the Economy - Economics of Projects - Costing - Projects and Productivity - Estimating and Competitive Tendering - Investment Appraisal - Cash Flow and Financing Projects.

CIVE 6102 - ENVIRONMENTAL MANAGEMENT 1

Concept of sustainable development; Environmental management tools; EIA; EMS; Environmental legislation; Environmental audits; Waste audits; Risk assessment; Case studies; Environmental problems in Mauritius; Economic tools to encourage pollution control.

CSE 6005 - MANAGEMENT INFORMATION SYSTEMS

Introduction to Information Systems and their requirements. Early development in IS, conventional systems analysis, comparisons and problems. IS Methodologies. Systems approaches, planning approaches, participation, prototyping, structural methodologies, data analysis. Tools. Database management systems, Query language, project management tools, expert systems. Methodologies - SSADM, SSM, etc. Selection and use of systems. Decision support systems, distributed computing and autonomous agent technology. Databases.

ENGG 6000 - PROJECT

The candidate, in undertaking a project, is expected to demonstrate a strong ability to apply skills and techniques acquired during the course to solve industrial engineering and/or management related problems.

ENGG 6202 - RESEARCH METHODS

The Research Concept. The Research Process. Surveys and Sampling Design. The Choice of Analysis, review of basic statistics, regression analysis, analysis of variance, multiple regression, hypothesis testing, dummy variable in regression, one way ANOVA, theory and application of maximum likelihood methods.

ENGG 6410 - ASSET MANAGEMENT

Defining the position of asset management within the corporate business - Establishing an asset maintenance policy - Role of the asset manager - Selecting appropriate maintenance management strategies - Techniques for predicting and minimising operating costs - Choosing a suitable procurement option - Information management and feedback.

MECH 6101 - MANAGING QUALITY

Background to TQM, The Gurus: Juran and Deming, Crosby and Oakland, Leadership and Strategy, Know Your Customers, Empowerment, Tools and Methodologies, Process Mapping, Functional Analysis, Taguchi techniques, Benchmarking, Quality Function Deployment, Policy Function Deployment, Quality Circles and Task Teams, Monitoring and Evaluating Organisational Performance, Promoting Continuous Improvement, Quality Measurement, The European Quality Award Model, Case Study: Mauritian Quality Award, TQM in Government: Best Value, TQM In Health Care.

MECH 6102 - DESIGN OF MANUFACTURING SYSTEMS

The Manufacturing System (history, importance, function, etc.), Manufacturing Strategy, Systems Concepts, Manufacturing Systems modeling techniques, Conceptual model of a manufacturing system, System Analysis, Auditing of Manufacturing Systems, Computer simulation for manufacturing system analysis (Use of Simulation software), Process mapping, and Value Stream Mapping Techniques.

MECH 6103 - INDUSTRIAL SYSTEMS ANALYSIS

Introduction to Industrial Engineering and productivity; measurement of productivity; Work study; Method study; Work measurement; Job evaluation; wage incentive plans; Introduction to Ergonomics; General Framework and Industrial applications, Man-Machine Relationships, Characteristics, Interactions, Design and Selection of Displays and Controls, Application of Anthropometric data and Design of Workplace, layouts, Environmental Studies, Industrial Safety, Process Control, Total Productive Maintenance and Overall Equipment Effectiveness Index, Case Studies.

MECH 6201 - QUALITY SYSTEMS AND AUDITING

Review of the development of quality systems over the last 40 years, ISO 9000 quality systems - the requirements and guidance sections broken down into detail, The management perspective - the major role of management, the strategic implications, operational implementation problems outlined and discussed, Quality system planning and implementation - documentation structures, breaking down barriers, communication, resource requirements, timescale, etc., Types of Quality Audit (internal/external) - Audit Preparation and Planning/ Conducting Audits, Techniques for Auditing/ Checklist for Auditors, Auditor Responsibilities, Nonconformities, Surveillance, Audit Standards, The advent of self assessment systems, the basic concept, scoring systems. Analysis of the European Foundation for Quality Management (EFQM) Business Excellence Model. The Scottish Quality Management System. The development of ISO 9000 beyond the millenium. Its relationship with TQM.

MECH 6306 - PRODUCTION AND OPERATIONS MANAGEMENT

The Production and Operations function - Production Planning and Control, Scheduling, Loading, Forecasting - Work Study, Ergonomics and Plant Lay-out - Materials Management: Deterministic and Probabilistic Models, MRPI, MRPII, JIT - Decision-making Techniques: Linear Programming & Sensitivity Analysis, Transportation, Queuing and Simulation - New trends in Production and Operations Management.

MECH 6406 - COMPUTER INTEGRATED MANUFACTURING SYSTEMS (CIMS)

CIM models and concepts, Analysis tools for manufacturing (Planning cycle, Requirements analysis, data preparation and analysis, system configuration and technical evaluation, return on investment analysis, system design and documentation, system simulation), CAD/CAM (CAD and its role in manufacturing, Numerical Control, FMS), Automated Assembly and Robotics.

MECH 6407 - OCCUPATIONAL SAFETY

Implications of hazards in the workplace; duties and responsibilities at various levels; setting up and testing Safety procedures; devising Safety rules and Safety management guidelines; Fire Prevention; Electrical Safety; Mechanical Safety; Chemical Safety; Accident Prevention and Accident Investigation; Personal Protective Equipment and Clothing; Statutory (and non-statutory) inspection of Machinery and Equipment; Environmental issues: Wastes, effluents, emissions, monitoring, controlling; Housekeeping: Case studies to illustrate importance and practical solutions; Safety Audits and Auditing techniques.

MECH 6408 - OPERATIONS RESEARCH

Introduction to OR. Historical development and nature of OR projects. Phases of OR study. Model building and various types of OR problems. Linear Programming Techniques; Forecasting Techniques; Decision Techniques; Waiting Lines Models; Simulation; Materials Management; Network Analysis; Dynamic Programming; Decision Theory; Game Theory; and Markov Analysis.

MECH 6409 - MAINTENANCE MANAGEMENT

Overview and Historical Development of Maintenance. Maintenance Strategies: Preventive and Planned Maintenance, Computerised Maintenance Management Systems, Maintenance Engineering (Plant Availability, Reliability, Reliability-Centred Maintenance, Rehabilitation). Plant Maintenance. Maintenance Costs. Management of Maintenance. Condition Monitoring Concepts. Principles and Economics. Vibration Based Condition Monitoring. Oil Based Condition Monitoring. Life Cycle Costing. Design and Manufacture Considerations. Non-Destructive Testing Techniques. Failure Mechanisms and Safeguard against them.

MECH 6410 - ENERGY MANAGEMENT

Fundamental principles of energy management. Auditing including: Energy Auditing, Energy Technologies, Cogeneration, Waste Heat Recovery, Economic Analysis and Methods of Energy Project Evaluation, Energy Management Systems.

Case Studies dealing with initiating, organizing and managing energy management programs.

MGT 5109 - EMPLOYMENT LAWS

The common and statutory law of employment relationship. Employment discrimination matters and other employment laws. Workers' compensation and pension issue. Rules governing hiring, firing. Regulation of wages and hours, and various contract and tort claims. Health and Safety Legislation.

MGT 5212 - HUMAN RESOURCES AND QUALITY MANAGEMENT

Managing and the Environment: the Management Challenge, the Evolution of Management Environment, Social Responsibility, and Ethics, the Global Management Environment. Planning: Decision Making, Planning, Strategy. Organising: Organisational Structure and Design, Job Analysis, Design, and Redesign Human Resource Management. Leading: Group Dynamics and Team Building, Motivation, Leadership, Interpersonal and Organisational Communication. Controlling: Control Systems, Managing Production and Operations, Managing Services, Managing Organisational Change. Growth, Technology and Innovation: Entrepreneurship and Growth, Technology and Innovation. Behavioural Issues in Quality Management: The role of management in sustaining continuous quality improvement, Culture Change & Quality, Building Commitment for Quality, Teamwork & Total Quality, Employee Involvement & Empowerment for Quality, Communication for Total Quality, Quality Training.

MGT 5282 - STRATEGIC MANAGEMENT FOR EXECUTIVES

Defining Strategic Management: from Strategic Planning to Strategic Management; Fundamentals of Strategic Management: the S-C-P Paradigm and Transaction Cost Theory; The Strategy Management Process; The Resource Based Competence Model; Competitive Analysis and Strategic Groups; Building Competitive Advantage and Endogenous Growth; SWOT Analysis; Portfolio Analysis Techniques; Growth Strategies; Competitive and Functional Strategies; Implementing Strategy: Structure & Culture; Agency Theory & Leadership; Evaluation and Control; Case Studies and/or Strategic Audits.

MGT 6115 - BUSINESS-TO-BUSINESS MARKETING

The Industrial Marketing Environment; The nature of Industrial Buying; The Interpersonal Dynamics of Industrial Buying Behaviour; Industrial Marketing Research; Industrial Market Segmentation; Target Marketing and Positioning; Product Development, Management and Strategy; Price Planning and Strategy; Promoting and Selling the Industrial Product; Distributing the Industrial Product.

MGT 6180 - MANAGING HUMAN RESOURCES

History, Evolution and Developments; Comparison between HRM and Personnel Management; D. Guest, Harvard models, etc. Culture and Change management in HRM; Strategic Human Resource Management. Tenets of HRM; Human Resource Strategy; Human Resource Planning; Recruitment and Selection. Tenet of HRM - Human Resource Development; Training and Development; Performance Management; Management Development; Employee Development and Self development; Career Development; Tenets of HRM; Employee Relations (ER); Perspectives in ER; Stakeholders in ER; ER Practices; Reward Management; International HRM; HRM and IT.

MGT 6211 - BUSINESS ETHICS AND CORPORATE GOVERNANCE

The ethical organisation; Corporate governance as a way of life; Teleology; Deontology; Ethical formalism; Conception of equality; Moral versus relativistic dimensions; Cultural implications; Ethics in business; Stakeholder theory; Personal v/s corporate values; Bribery viewed by different ethical philosophies; Reform strategies; Education and training in ethics; Economic and political reform; Institutional reform and social empowerment.