

# **BSc (Hons) Production and Operations Management - E340 (Under Review)**

## **1. Introduction**

In the manufacturing industry today there is a need for graduates capable of moving into management positions. This requires a broader range of skills than provided by the conventional single discipline engineering degree and needs an enhanced awareness of business, manufacturing processes and technology and the important information systems that underpin them.

This programme meets the needs of students who wish to pursue a management career in the manufacturing industry but who do not wish to follow the traditional single discipline engineering route. It is based upon the coherent core themes of manufacturing processes, manufacturing systems and manufacturing organisation in an incremental and structured manner and shares a number of common modules with the BSc (Hons) Management programme. This programme is targeted at the many technical management positions new to the graduate market that are now opening up in the manufacturing industry.

## **2. General Entry Requirements**

As per General Entry Requirements for admission to the University for Undergraduate Degrees.

## **3. Programme Requirements**

2 GCE 'A' Level passes including Mathematics.

### **4. (i) Minimum Requirements for Degree Award – 100 credits**

### **(ii) Minimum Requirements for Diploma Award – 60 credits**

A student may opt for a Diploma in Production and Operations Management provided s/he satisfies the following minimum requirements.

<b>MODULES</b>	<b>CREDITS</b>
Modules from Levels 1 & 2	54
Diploma Project	6
<b>TOTAL</b>	<b>60</b>

The Diploma project would normally be of 8 weeks duration for an input of at least 90 hours.

## **5. Programme Duration**

	<b>Normal (Years)</b>	<b>Maximum (Years)</b>
Degree:	3	5

## **6. Credits per Year**

Minimum 18, Maximum 48, subject to Regulation 5 above.

## **7. Assessment**

Assessment will be based on a written examination of 2 to 3-hour duration (normally a paper of 2 hour duration for modules carrying less or equal to 3.5 credits and 3 hour paper for modules carrying four-six credits) and on continuous assessment done during the semester or year.

Written examinations for all modules, whether taught in semester 1 or in semester 2 or both, will be carried out at the end of the academic year (unless otherwise stated).

The continuous assessment will count for 10-40% of the overall percentage mark of the module(s), except for a Programme where the structure makes for other specific provision(s). Continuous assessment may be based on laboratory work, seminars and/or assignments and **should include at least 1 class test.**

There will be a compulsory class test for all modules taught in semester 1 at the end of semester 1 of the given academic year unless stated otherwise in the Programme Structure.

A minimum of at least 30% should be attained in each of continuous assessment and written examination, with an overall total of 40% for a candidate to pass a module.

Special examinations (e.g. class tests) will be arranged at the end of semester 1 or semester 2 for exchange students who have registered only for one semester. In case of yearly modules, credits will be assigned on a pro-rata basis.

## 8. Important Note

This BSc programme is not a professional programme and this degree may not be adequate for registration with the Council of Registered Professional Engineers (CRPE).

## 9. List of Modules - BSc (Hons) Production and Operations Management

### CORE MODULES

Code	Module Name	Hrs/Wk	Credits
		L+P	
MECH 1006Y(1)	Quantitative Methods	3+0	6
MECH 1007Y(1)	Operations Management 1	3+0	6
MECH 1008Y(1)	Basic Computer Applications*	2+1	5
CSE 1010e(1)	Introduction to Information Technology	O.E.	3
COMS 1010(1)	Communication Skills	D.E.	3
MECH 1250(1)	Production Technology I	3+0	3
MECH 2019(3)	Project Appraisal Techniques	2+0	2
MECH 2009Y(3)	Operations Management 2	3+0	6
MGT 2078Y(3)	Industrial Marketing and Supply Chain Mgt	3+0	6
MECH 2007Y(3)	Industrial Automation	3+1	7
MECH 2008Y(3)	Production Technology II	3+1	7
MECH 3000Y(5)	Degree Project	-	9
MECH 3007Y(5)	Quality Management Systems	3+0	6
MECH 3004Y(5)	Business and Manufacturing Strategy	2+0	4
MECH 3005Y(5)	Industrial Engineering	3+0	6
MECH 3006Y(5)	Occupational Health and Safety	3+0	6
MECH 3061(5)	Maintenance Management	3+0	3
MGT 1026Y(1)	Principles and Practice of Management	3+0	6
MGT 2061Y(3)	Human Resource Management	3+0	6

\* To be assessed by continuous assessment only

**10. Programme Plan – BSc (Hons) Production and Operations Management**

**YEAR/LEVEL 1**

<b>Code</b>	<b>Module Name</b>	<b>Hrs/Wk L+P</b>	<b>Credits</b>
<b>CORE</b>			
MECH 1006Y(1)	Quantitative Methods	3+0	6
MECH 1007Y(1)	Operations Management 1	3+0	6
MECH 1008Y(1)	Basic Computer Applications*	2+1	5
CSE 1010e(1)	Introduction to Information Technology	O.E.	3
COMS 1010(1)	Communication Skills	D.E.	3
MGT 1026Y(1)	Principles and Practice of Management	3+0	6
MECH 1250(1)	Production Technology I	3+0	3

\* To be assessed by continuous assessment only

**YEAR/LEVEL 2**

<b>Code</b>	<b>Module Name</b>	<b>Hrs/Wk L+P</b>	<b>Credits</b>
<b>CORE</b>			
MECH 2009Y(3)	Operations Management 2	3+0	6
MGT 2078Y(3)	Industrial Marketing and Supply Chain Mgt	3+0	6
MECH 2007Y(3)	Industrial Automation	3+1	7
MGT 2061Y(3)	Human Resource Management	3+0	6
MECH 2008Y(3)	Production Technology II	3+1	7

**SEMESTER 2 CORE MODULE**

MECH 2019(3)	Project Appraisal Techniques	2+0	2
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**YEAR/LEVEL 3**

<b>Code</b>	<b>Module Name</b>	<b>Hrs/Wk L+P</b>	<b>Credits</b>
<b>CORE</b>			
MECH 3000Y(5)	Degree Project	-	9
MECH 3007Y(5)	Quality Management Systems	3+0	6
MECH 3004Y(5)	Business and Manufacturing Strategy	2+0	4
MECH 3005Y(5)	Industrial Engineering	3+0	6
MECH 3006Y(5)	Occupational Health and Safety	3+0	6

**SEMESTER 2 CORE MODULE**

MECH 3061(5)	Maintenance Management	3+0	3
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**Total number of credits for the award of the degree = 32 + 34 + 34 = 100**

## 11. Outline Syllabus

This outline syllabus is not prescriptive and is intended to serve as a guide only.

Note: Pre-requirement (PQ), Pre-requisite (PR).

### **COMS 1010(1) - COMMUNICATION SKILLS**

Writing skills, non-verbal communication, modes of speech delivery and presentation aids, speeches, perception and listening skills, business and technical writing.

### **CSE 1010e(1) - INTRODUCTION TO INFORMATION TECHNOLOGY**

IT and Computers; Stepping in the Computer; Input and Output Devices; Secondary Storage; Programming; Systems Software; Applications Software; Systems Development; Computer Networks; The internet; Computer Security; Software Utilities; Issues and Trends in IT.

### **MECH 1006Y(1) - QUANTITATIVE METHODS**

Exponential and trigonometric functions; graph sketching; Series representation of exponential and trigonometric functions; Calculus of one and several variables; Complex numbers; Polynomials and roots; Differential equations: 1st and 2nd order linear differential equations with constant coefficients, solution via the auxiliary equation, non-homogeneous equations, application to production systems; Probability and statistics: Permutations and combinations, random events and assignment of probability, axioms of probability, Venn diagrams, independence, conditional probability and Baye's rule, Bernoulli trials, discrete and continuous random variables, Probability density (PDF) and cumulative distribution (CDF) functions, mean and variance, uniform, Gaussian and Poisson PDFs, The Central Limit Theorem, Estimation and Hypothesis testing, Linear regression and correlation.

### **MECH 1007Y(1) - OPERATIONS MANAGEMENT 1**

Introduction to the Production and Operations Management: Productivity, Competitiveness, Business and Manufacturing Strategy, Decision Analysis, Break Even Analysis, Forecasting, Product Design, Process Selection and Capacity Planning, Plant layout, Location Planning and Analysis, Line Balancing, Introduction to Quality and TQM, Supply Chain Management, Aggregate Planning and Scheduling.

### **MECH 1008Y(1) - BASIC COMPUTER APPLICATIONS**

Introduction to Database Management Systems and Access, SQL, Visual Basic, User Interfaces, Software packages in Business Applications: Conventional Representation of Drawings, AutoCAD 2D, Introduction to 3D, Production of Business and Technical diagrams using Visio.

### **MECH 1250(1) - PRODUCTION TECHNOLOGY I**

Engineering Materials (metals, plastics, composites, elastomers, ceramics): Production, Properties, Applications; Testing: Destructive & NDT; Common Manufacturing processes: Casting, Forming (hot & cold), Powder Metallurgy, Joining Processes: Welding & Adhesives.

### **MECH 2009Y(3) - OPERATIONS MANAGEMENT 2**

Inventory Management and Advanced Inventory Model, Outsourcing and Purchasing, MRPI, MRPII, Finite Scheduling and OPT, ERP (Enterprise Resource Planning), Project Management, Linear Programming Techniques, Decision & Utility Theory, JIT Systems, Queuing Theory, Network Models, Dynamic programming, Replacement Theory, Sequencing and Goal programming, Industrial Relations & Laws, Industrial Disputes and Disciplines, Contracts & Tendering.

### **MECH 2007Y(3) - INDUSTRIAL AUTOMATION**

Manufacturing lead-time and its computation, Production Economics, CAD, CAM, Feasibility Study for implementation of automated systems, NC systems, programming, Group technology, FMS, Plant layout configurations in manufacturing systems, Introduction to Robotics, Introduction to PLC.

Simulation: System concepts, Manufacturing Simulation: concepts, types of application, available systems. Simulation models; drawing and understanding activity and entity life cycle diagrams, hand simulation. Experimentation, verification and validation. Concepts of, warm-up, run length, repetition, experimentation and analysis of results. Introduction to computer-assisted simulation: building models on a computer using

WITNESS/Simul8 Visual Interactive Simulation package. Entity life cycle diagrams, use of attributes, collection of statistics, producing graphics. Model building & Simulation individual project.

### **MECH 2008Y(3) - PRODUCTION TECHNOLOGY II**

Metrology: Errors, Standards, Fits, Limits, Tolerance, Gauges, Comparators, Linear, Angular, Surface roughness, Surface roundness, CMM, Interferometry; Basics of Heat Treatment; Conventional Machining processes: Turning, Milling, Drilling, Shaping, Boring, Reaming; Introduction to Abrasive processes: Grinding & Lapping; Introduction to non-conventional machining processes: EDM, ECM, USM, LM, etc.; Introduction to Tribology (wear & lubrication); Introduction to Surface Engineering; laboratory demonstrations.

### **MECH 2019(3) - PROJECT APPRAISAL TECHNIQUES**

Introduction to different branches of Economics. Microeconomics: Supply and Demand Analysis, Monopoly & Competition Macroeconomics: National Income Accounting, Multiplier Effect, Open and Closed Economies.

Engineering Economics: Investment Appraisal Techniques, Resource and Environmental economics. Welfare Economics: Indifference curves, Choices for the development of society. Accounting for decision-making: concepts, Elements of Costing methods and Techniques, Accounting ratios, applications to engineering.

### **MECH 3000Y(5) - PROJECT**

Project in Manufacturing Engineering, operations management or Related Areas of about 10,000 to 12,000 words.

### **MECH 3007Y(5) - QUALITY MANAGEMENT SYSTEMS**

Quality definitions and history. Business Excellence Model - MBNQA. Total Quality Management. Quality Leadership. Quality Standards: Organising for TQM. Quality Planning and Error Prevention. Team building and quality. Training for quality. Quality improvement and communication. Quality tools and techniques. Cost of Quality. Benchmarking.

ISO 9000 Standards – Part 1 & II, ISO 14000 Series, Internal & External Quality Auditing, Statistical Process Control, Control charts for Attributes, Control charts for Variables, Process Capability Indices, Quality Circle, Quality Planning, Continuous Improvement.

### **MECH 3004Y (5) - BUSINESS AND MANUFACTURING STRATEGY**

Introduction to Strategy Formulation at: Corporate level, Business level, Functional level. Portfolio Analysis (BCG Matrix, GE Matrix). Strategy Formulation: Ansoff Matrix, Strategic Planning: Tools and Techniques. Environmental Scanning: The SWOT Analysis, Analysis of the Competitive Environment (Porter's Five forces model). Porter's Generic Strategies (cost leadership, differentiation, focus), Identification and evaluation of strategic alternatives. Strategy Implementation: Framework for understanding implementation issues, Tactical aspects of strategy implementation. Strategy Evaluation and Control.

Strategic issues in Manufacturing, Value Chain, Manufacturing Strategy Content and Process, Manufacturing Strategy Auditing, Product Design and Development, Process Choice and Strategy, Quality as a Strategic Factor, Strategic importance of Inventory Management, Strategic Human Resource Management, Lean manufacturing, Strategic Choices in Manufacturing, World Class Manufacturing.

### **MECH 3005Y(5) - INDUSTRIAL ENGINEERING**

Productivity in the Enterprise, Method Study (Procedures, Charting, Micro motion study), Work Measurement (Procedures, Rating, Setting standards), Design of plant layout, Work place engineering, Organisation of work study department, Techniques to reduce work content, Work Physiology, Management of ageing in work situation. Systems modelling, Classification of Manufacturing System Models, System methodologies & Modelling tools, Introduction to Simulation of Manufacturing Systems, Systems Analysis and Auditing.

Human and Workplace Design; Effect of Climate, noise, vibrations, vision, lighting and aeration on human performance; Industrial Design and Ergonomics.

### **MECH 3006Y(5) - OCCUPATIONAL HEALTH AND SAFETY**

Environmental Management Framework (ISO 14000, Green Globe, etc) - Environmental Auditing - Integrating EMS with Health, Safety and Quality Systems. Occupational Safety, Health and Welfare Act Subsidiary Legislation on Health and Safety, Development of Positive OSH and Environment Culture - The Total Quality Management Approach. Planning a Safe Place of Work: Setting of Objectives - Establishing Performances Standards – Improvement and Development of Organisational Culture – Hazards (Civil, electrical, mechanical, chemical, etc) Controlling Hazards and Risks. Organisation Structure to Implement a Safe Place of Work: Co-operation at Work: Workers Participation and Commitment – Communication: Conference of Employees – Training – Safety Committees – Safety Inspection – Organisation Structure – Job Design – Safety at Design.

### **MECH 3061(5) - MAINTENANCE MANAGEMENT**

Introduction to Maintenance, Failure mode of mechanical components, FMECA, FTA, Introduction to reliability engineering, Safety engineering, Maintenance management practices (breakdown, preventive, predictive, CBM, RCM).

### **MGT 1026Y(1) - PRINCIPLES AND PRACTICE OF MANAGEMENT**

Part 1: The study of organizations; The environment of Organizations; Evolution of Management theory; Management concepts; Functional Areas of Management: Production, Finance, HR and Marketing, The Managerial functions of Planning, Leading , Organising, Controlling; Managerial Skills. Part 2: Managing individuals in organisations: Managing differences; Motivation, Managing Groups and Teams: Group behaviour; Conflict and co-operation; Power and Politics; Leadership; Social Responsibility. Part 3: Managing Structure and processes: Organisational structure; Job design; Restructuring, Communications, Careers, Change; Diversity; Knowledge Management. Part 4: Evolution of Marketing, Marketing Mix, 4 Ps of marketing.

### **MGT 2061Y(3) - HUMAN RESOURCE MANAGEMENT**

Evolution of HRM, HRM policy goals, SHRM - HRM and organisational performance, Individual performance - attitudes and behaviour, Organisational citizenship behaviour and organisational culture, Psychological contracts, Organisational justice, Job redesign and team working, Human resource planning, Recruitment and selection, Performance appraisal and management, Reward management, Training and development, Employee relations. International human resource management - management of expatriates, cross cultural management, Comparative human resource management (US, EU, Japan, Asia-Pacific, etc.), Public sector HR (New public management), Criticisms of HRM, Case Study and seminars.

### **MGT 2078Y(3) - INDUSTRIAL MARKETING & SUPPLY CHAIN MANAGEMENT**

The industrial marketing System: Participants, channels, the relationships. Demand and product characteristics. The industrial customer. Purchasing systems. Value and vendor analysis. Marketing intelligence system. Marketing strategy; Product and service component, the price component, the promotional component, the channel component. Industrial marketing control-Strategic goals and instruments of control.

Understanding the Supply Chain. Supply Chain Performance: Achieving Strategic Fit & Scope. Supply Chain Drivers and Obstacles. Demand Forecasting in a Supply Chain. Aggregate Planning in the Supply Chain: Managing Predictable Variability. Managing Economies of Scale in the Supply Chain: Cycle Inventory. Managing Uncertainty in a Supply Chain: Safety Inventory. Determining Optimal Level of Product Availability. Transportation in the Supply Chain. Facility Decisions: Network Design in the Supply Chain. Information Technology and the Supply Chain. Coordination in the Supply Chain. E-business and the Supply Chain. Financial Evaluation of Supply Chain Decisions.