

BEng (Hons) Mechanical Engineering - E440 (Under Review)

1. Objectives

The Programme is intended to impart to prospective students the fundamentals of mechanical/manufacturing engineering theory and design. The training Programme comprises both theory and laboratory sessions designed to enable students to develop skills needed in the practice of the profession. The Programme is broad-based to ensure job opportunities in various sectors, namely government, parastatal or private upon successful completion of pre-registration training to the status of professional engineer. The scheme of study also offers adequate background for further studies/research at graduate level and beyond both locally and abroad.

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 in Mathematics and one of the following subjects: Physics, Physical Science, Engineering Science, Physics with Chemistry, Design & Technology (Technology).

4. (i) Minimum Requirements for Degree Award

MODULES	CREDITS
Humanities & Management	6
Basic Sciences & Mathematics	12
Engineering	112
TOTAL	130

For the degree award all core modules prescribed by the Department must be completed. Industrial training must be completed satisfactorily for the award of the degree.

(ii) Minimum Requirements for Diploma Award

A student may opt for a Diploma in Mechanical Engineering provided s/he satisfies the following minimum requirements. The Diploma project would normally be of 8 weeks duration for an input of at least 90 hours.

MODULES	CREDITS
Humanities & Management	3
Basic Sciences & Mathematics	6
Engineering	45
Diploma Project	6
TOTAL	60

5. **Programme Duration:** Normal 4 years
Maximum 7 years
6. **Credits per Semester:** Minimum 9, Maximum 24 subject to Regulation 5.
7. **Minimum Credits Required for Degree Award:** 130

For the award of the BEng (Hons) Degree in Mechanical Engineering, the student must obtain at least 130 credits including 114 credits from all the core modules prescribed by the department and at least 13 credits (minimum of 6 credits from Year 4 modules) from the engineering elective modules.

8. **Assessment**

As per University regulations on assessment (c.f. section 2.7).

Modules (if any) to be assessed jointly will be indicated prior to delivery of the modules.

Modules MECH 1111(1), MECH 1212(1) and MECH 3133(5) will be assessed solely by continuous assessment.

Students will have to take failed core modules in the next corresponding semester. In case the number of failed core modules exceeds three, the student will have to compulsorily take at least three failed core modules in the next corresponding semester.

9. List of Modules - BEng (Hons) Mechanical Engineering

<u>CORE MODULES</u>		Hrs/Wk	Credits
		L+P	
BASIC SCIENCES & MATHEMATICS			
MATHS 1111(1)	Mathematics 1	D.E.	3
MATHS 1211(1)	Mathematics 2	D.E.	3
MATH 2101(3)	Mathematics 3	3+0	3
MATH 2242(3)	Linear Algebra and Applications	3+0	3
ENGINEERING			
CHE 1106(3)	Thermodynamics	D.E.+1	3.5
CIVE 1204(1)	Fluid Mechanics	3+1	3.5
CSE 1010e(1)	Introduction to Information Technology	O.E.	3
ELEC 1204(1)	Computer Programming	2+2	3
ELEC 1101(1)	Electrical Engineering	3+1	3.5
ELEC 1202(1)	Electronics 1	3+1	3.5
MECH 2123(3)	Metrology	2+1	2.5
MECH 2121(3)	Engineering Materials	3+1	3.5
ELEC 2104(3)	Microprocessors 1	3+1	3.5
ELEC 2108(3)	Electrical Machines	3+2	4
ELEC 2211(3)	Control Systems 1	3+0	3
MECH 1111(1)	Engineering Graphics 1	2+2	3
MECH 1200	Vacation Training	-	0
MECH 1213(1)	Applied Mechanics	3+1	3.5
MECH 1212(1)	Engineering Graphics 2	1+2	2
MECH 2122(3)	Production Engineering	3+1	3.5
MECH 2228(3)	Structural Mechanics and Dynamics 1	3+1	3.5
MECH 2224(3)	Manufacturing Technology	3+1	3.5
MECH 2226(3)	Thermal Science 1	3+1	3.5
MECH 3132(3)	Engineering Management 1	3+0	3
MECH 3133(5)	Engineering Design	2+2	3

MECH 3134(5)	Structural Mechanics and Dynamics 2	3+1	3.5
MECH 3000	Industrial Training	-	0
MECH 3130(5)	Heat Transfer 1	3+1	3.5
MECH 4151(5)	Structural Mechanics and Dynamics 3	3+0	3
MECH 3137(5)	Quality & Reliability	3+0	3
MECH 4000(5)	Degree Project	-	12
MECH 4256(5)	Engineering Management 2	3+0	3
MECH 4152(5)	Automotive Systems	3+0	3
MECH 3238(5)	Engineering Maintenance	3+0	3

HUMANITIES & MANAGEMENT

COMS 1010(1)	Communication Skills	D.E.	3
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ELECTIVES

ENGINEERING

MECH 4153(5)	Heat Transfer 2	3+0	3
MECH 4154(5)	Thermal Science 2	3+0	3
MECH 4055(5)	Refrigeration & Air Conditioning	3+0	3
MECH 4258(5)	Structural Mechanics and Dynamics 4	3+0	3
MECH 2227(3)	Fluid Power & Drives	3+1	3.5
MECH 4257(5)	Energy Management	3+0	3
ELEC 4119(5)	Instrumentation & Control	3+0	3
ELEC 3114(5)	Microprocessors 2	3+2	4
TXT 3171(3)	Textile Machinery	3+0	3

HUMANITIES & MANAGEMENT

ACF 1000(1)	Accounting for Financial Decision Making	3+0	3
ECON 1015(1)	Economics	3+0	3

NOTE 1: Engineering Electives

Students are required to take at least 13.0 credits (minimum of 6 credits from Year 4 modules) in the engineering category.

NOTE 2: Students are allowed to choose any elective module contained in GEMs list available at the Faculty's Office. However, the offer of the electives would be subject to availability of resources and existence of a critical mass of demand for the modules. Students are requested to contact their Course Adviser before entering any module under the GEMs in their module registration form.

10. Programme Plan - BEng (Hons) Mechanical Engineering

YEAR 1							
Semester 1				Semester 2			
Code	Module	Hrs/Wk L+P	Credits	Code	Module	Hrs/Wk L+P	Credits
CORE				CORE			
MATHS 1111(1)	Mathematics 1	D.E.	3	MATHS 1211(1)	Mathematics 2	D.E.	3
MECH 1111 1)	Engineering Graphics I*	2+2	3	MECH 1213(1)	Applied Mechanics	3+1	3.5
CHE 1106(3)	Thermodynamics	D.E.+1	3.5	ELEC 1202(1)	Electronics 1	3+1	3.5
ELEC 1101(1)	Electrical Engineering	3+1	3.5	ELEC 1204(1)	Comp. Programming	2+2	3
CSE 1010e(1)	Introduction to IT	O.E.	3	CIVE 1204(1)	Fluid Mechanics	3+1	3.5
COMS 1010(1)	Communication Skills	D.E.	3	MECH 1212(1)	Engineering Graphics 2*	1+2	2
				MECH 1200	Vacation Training	-	0
ELECTIVES				ELECTIVES			
ECON 1015(1)	Economics	3+0	3	ACF 1000(1)	Acc for Fin Decision Making	3+0	3

YEAR 2							
Semester 1				Semester 2			
Code	Module	Hrs/Wk L+P	Credits	Code	Module	Hrs/Wk L+P	Credits
CORE				CORE			
MATH 2101(3)	Mathematics 3	3+0	3	MATH 2242(3)	Linear Algebra & Applications	3+0	3
MECH 2121(3)	Engineering Materials	3+1	3.5	MECH 2228(3)	Structural Mech & Dynamics1	3+1	3.5
MECH 2122(3)	Production Engineering	3+1	3.5	MECH 2224(3)	Manufacturing Tech.	3+1	3.5
ELEC 2108(3)	Electrical Machines	3+2	4	MECH 2226(3)	Thermal Science 1	3+1	3.5
ELEC 2104(3)	Microprocessors 1	3+1	3.5	ELEC 2211(3)	Control Systems 1	3+0	3
MECH 2123(3)	Metrology	2+1	2.5				
ELECTIVES				ELECTIVES			
				MECH 2227(3)	Fluid Power & Drives	3+1	3.5

YEAR 3

Semester 1				Semester 2			
Code	Module	Hrs/Wk L+P	Credits	Code	Module	Hrs/Wk L+P	Credits
CORE				CORE			
MECH 3132(3)	Engineering Management 1	3+0	3	MECH 3238(5)	Engineering Maintenance	2+2	3
MECH 3133(5)	Engineering Design*	2+2	3	MECH 3000	Industrial Training	-	0
MECH 3134(5)	Structural Mech & Dynamics 2	3+1	3.5				
MECH 3130(5)	Heat Transfer 1	3+1	3.5				
MECH 3137(5)	Quality & Reliability	3+0	3				
ELECTIVES							
TXT 3171(3)	Textile Machinery	3+0	3				
ELEC 3114(5)	Microprocessors 2	3+2	4				

YEAR 4

Semester 1				Semester 2			
Code	Module	Hrs/Wk L+P	Credits	Code	Module	Hrs/Wk L+P	Credits
CORE				CORE			
MECH 4000(5)	Degree Project Pt 1	-	6	MECH 4000(5)	Degree Project Pt 2	-	6
MECH 4151(5)	Structural Mech & Dynamics 3	3+0	3	MECH 4256(5)	Engineering Management 2	3+0	3
MECH 4152(5)	Automotive Systems	3+0	3				
ELECTIVES				ELECTIVES			
MECH 4153(5)	Heat Transfer 2	3+0	3	MECH 4258(5)	Structural Mech & Dynamics 4	3+0	3
MECH 4154(5)	Thermal Science 2	3+0	3	MECH 4257(5)	Energy Management	3+0	3
ELEC 4119(5)	Instrumentation & Control	3+1	3	MECH 4055(5)	Refrigeration & Air Conditioning	3+0	3

NOTE: * Modules to be assessed by continuous assessment

11. Outline Syllabus

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

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

ACF 1000(1) - ACCOUNTING FOR FINANCIAL DECISION MAKING

The Role of Accounting Information; Recording and Summarising Transactions; Accounting Concepts & Preparing Final Accounts; Adjustments to Final Accounts; Capital v/s Revenue Expenditure; Bank Reconciliation Statement; Accounting Ratios; Accounting for Internal Decision Making Techniques; Elements of Cost; Costing Methods & Techniques; Decision Making Techniques; Accounting for Manufacturers; Budgets.

CHE 1106(3) - THERMODYNAMICS (L/P - 3.5)

Thermodynamics System and Properties of Substances. First and Second laws and their Applications. Enthalpy and Auxiliary functions. Work, Heat and Power Cycles. Use of Relevant Tables e.g. Steam, Psychometric Charts.

CIVE 1204(1) - FLUID MECHANICS

Characteristics and properties of fluids. Fluid Statics. Stability of floating bodies. Principles of fluid motion. Momentum equation for steady flow. Continuity. Laminar and turbulent flow.

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.

ECON 1015(1) - ECONOMICS

Microeconomics: Economics and the economy; Demand, supply and the market; Elasticity concept; Theory of consumer choice; Theory of supply: costs and production; Market Structure; Labour market; Introduction to Welfare Economics.

Macroeconomics: Introduction, National income accounting; the determination of national income equilibrium; Aggregate demand; Fiscal policy and Foreign trade; Money and Banking; Monetary and fiscal policy; Unemployment; Inflation; Economic Growth.

ELEC 1101(1) - ELECTRICAL ENGINEERING (L/P - 3.5)

DC and AC single phase electric circuits. Magnetic Circuits. 3-phase Systems.

ELEC 1202(1) - ELECTRONICS 1 (L/P - 3.5)

PN Junction, Diode circuits, and Simple Transistor Circuits. Operational Amplifier. Combinational Logic. Flip Flops.

ELEC 1204(1) - COMPUTER PROGRAMMING (L/P - 3)

Introductory concepts, C Fundamentals, Operators and Expressions, Data Inputs and Outputs, Flowcharts and Pseudocodes, Control Statements, Arrays, Pointers, Data Files.

ELEC 2104(3) - MICROPROCESSORS 1 (L/P - 3.5)

Microprocessors, Internal Architecture, Instructions and Timing. Programming and Interfacing Devices.

ELEC 2108(3) - ELECTRICAL MACHINES (L/P - 4) (PQ: ELEC 1101(1))

Single and 3-Phase Transformers. Analysis and Performance of D.C. and A.C. Machines. Polyphase and Special Machines.

ELEC 2211(3) - CONTROL SYSTEMS 1 (L - 3)

Modelling of Single Input Single Output Systems. Time and Frequency Domain Analysis. Stability.

ELEC 3114(5) - MICROPROCESSORS 2 (L/P - 4) (PQ: ELEC 2104(3))

Different Modes of Parallel and Serial Data Transfer. Peripheral Chips and Programming. Transducers and Interfacing. Data Acquisition.

ELEC 4119(5) - INSTRUMENTATION AND CONTROL (L - 3)

Instrumentation System Elements. Transducers and Signal Conditioning. Display Devices. Measurement Systems Integration. Design of Compensators for SISO Systems. Introduction to Discrete Time Control Systems.

MATH 2242(3) - LINEAR ALGEBRA AND APPLICATIONS

Theory of simultaneous equations; Matrices; Vector spaces solution and Orthogonal projection; Problem solving; General difficulties and review.

MATHS 1111(1) - MATHEMATICS 1 (PR: A-LEVEL MATHEMATICS)

Calculus of one and several variables. Polar coordinates. Complex numbers. Hyperbolic functions. Limits. Ordinary differential equations.

MATHS 1211(1) - MATHEMATICS 2 (PR: A-LEVEL MATHEMATICS)

Matrix Algebra: Matrices and determinants. Solution of linear systems of equations. Eigenvalues and eigenvectors. Infinite Series: Comparison test and Ratio test for non-negative series. Vector Algebra: Scalar and vector products, triple products. Vector equations. Vector Analysis: Gradient, divergence and curl. Line and multiple integrals. Green's theorem in the plane, Divergence theorem and Stokes' theorem.

MATH 2101(3) - MATHEMATICS 3

Complex variables. Laplace and Fourier Transforms. Fourier series. Numerical solutions of differential equations.

MECH 1111(1) - ENGINEERING GRAPHICS I (L/P - 3)

Introduction to Drawing Office Practice, BS 308, etc; Geometrical constructions; Blending of curves; Linkages, Locus, Ellipse, cycloid, epicycloid, etc; Introduction to development (Prisms, cylinders, etc); Orthographic Projection (systems of projection); Dimensioning and Tolerancing; Sections and sectional views. Introduction to isometric projection; Standard Parts (Threading, Fasteners, etc); Assembly Drawing.

MECH 1200 - VACATION TRAINING (P - 0)

1 week mechanical workshop practice, 1 week automobile workshop, 1 week Computer Aided Drafting, 1 week Electronics Lab., Electrical Wiring Diagram, Building Civil Construction, Mini-project + Assessment.

MECH 1212(1) - ENGINEERING GRAPHICS 2 (L/P - 2) (PR: MECH 1111(1))

Further Isometric projection, True lengths & True Shapes, Further Development & Interpenetration, Development of Truncated Parts & Transition pieces, Assembly & Working Drawings, Drawing analysis, Cams, Gearing & Gears, Piping Drawing, Welding representation, Limits, Fits and Tolerances- BS 4500, Geometrical Tolerancing, Freehand sketching & Perspective Drawing.

MECH 1213(1) - APPLIED MECHANICS (L/P - 3.5)

Statics; Dynamics; Friction; Work Power and Energy; Direct Stress and Strain; Shear and Torsion; Shear Force & Bending Moment.

MECH 2121(3) - ENGINEERING MATERIALS (L/P - 3.5)

Atomic Structure and Inter Atomic Bonding, Crystalline Structure of Solids, Imperfections in Solids, Physical and Mechanical Properties of Metals, Plastic Deformation of Crystalline Materials, Phase Diagrams of Metals

and Alloys, Thermal Processing of Metals and Alloys, Production, properties and Application of Steels (carbon steels, alloy steels, etc), Production, properties and Application of some Non- Ferrous metals & alloys (Aluminum, Copper, Magnesium, Titanium, etc), Production, properties and Application of polymers (Thermosets, Thermoplastics, etc), Production, properties and Application of Reinforced Polymers, Production, properties & applications of Ceramics.

MECH 2122(3) - PRODUCTION ENGINEERING (L/P - 3.5)

Casting, Cold & Hot Working, Forming, Forging, etc., Machining Technology (Turning, Milling, Shaping, Drilling, Boring, etc) – principle of operation of processes, mathematical modelling of metal removal process, applications, factors affecting machining, machining parameters, accessories, etc., Tool Materials (Low carbon steels, HSS, Carbides, Ceramics, Cermets, Coated tools, Diamond, CBN, etc.) & Machinability (of tool materials with respect to different metals), Economics of Machining.

MECH 2123(3) - METROLOGY (L/P - 2.5)

Introduction to Metrology & Standards, Dimensional Properties & Errors, Tolerance, Fits & Gauges, Linear Measurement, Comparators & Angular Measurement, Introduction to Surface Texture Measurement, Surface Roundness Measurement, Interferometry, Introduction to CMM, Analogue ac and dc measuring instruments: moving coil, moving iron and, electro-dynamics instruments. Measurement of current, voltage, power and energy. Classification of data and errors, Uncertainty analysis.

MECH 2224(3) - MANUFACTURING TECHNOLOGY (L/P - 3.5)

Grinding Processes; Finishing Operations; Introduction to Joining Processes; Fusion welding (arc welding, TIG, MIG, Resistance welding, gas cutting, MAG, plasma, etc.); Adhesive Bonding; Introduction to Tribology (Wear, oil analysis, etc); Introduction to Non-conventional Machining Processes; Electro Discharge Machine (EDM).

MECH 2226(3) - THERMAL SCIENCE 1 (L/P - 3.5)

Heat Engine Cycle; Steam Boiler, Steam Plant, Displacement Machines, Nozzles, Mixtures; Introduction to Combustion and Internal Combustion Engines.

MECH 2227(3) - FLUID POWER AND DRIVES (L/P - 3.5)

Pneumatics & Hydraulics Systems; Standards; Generation of Pneumatic & Hydraulic Power; Design and Implementation of Pneumatics and Hydraulics Circuits; Pneumatics and Hydraulics Components – Valves, Actuators, etc.; Design of cascade circuits and troubleshooting; Electrohydraulic & Electropneumatic Systems and Components; Proportional Control; Systems Integration and Interfacing to PLC's and Microprocessors; Safety Aspects; Applications and Comparisons between Different Systems.

MECH 2228(3) - STRUCTURAL MECHANICS AND DYNAMICS 1 (L/P - 3.5) (PQ: MECH 1213(1))
Frameworks; Deflection of Beams; Strain Energy; Velocity Diagrams; Balancing; Crank Effort Diagrams; Belt Drives.

MECH 3000 - INDUSTRIAL TRAINING (P - 0)
Industrial Training of minimum duration 20 weeks.

MECH 3130(5) - HEAT TRANSFER 1 (L/P - 3.5)
Introduction to Conduction, Convection and Radiation. One Dimensional Steady State Conduction, External and Internal Flows, Free Convection, Radiation Processes and Properties.

MECH 3132(3) - ENGINEERING MANAGEMENT 1 (L - 3)
Introduction to the Production and Operations Management; Decision Analysis; Capacity Planning; Process Selection and Facility Layout; Location Planning and Analysis; Introduction to Quality; Introduction to Inventory Management: Requirements of an effective Inventory Management System; EOQ & EBQ models, Reorder levels, Quantity Discounts; Materials Requirement Planning; Project Management.

MECH 3133(5) - ENGINEERING DESIGN (L - 3)
The Engineering Design Process: Importance of Design, Design Project: Working in Teams, Data Collection methods (surveys, brainstorming), Concept Generation and Evaluation Methods, Configuration Design, Material Selection, Process Selection, Parametric Design, Risk, Reliability and Safety, Feasibility analysis, Quality Methods in Design (Value Engineering, Taguchi Method), Legal and Ethical issues in Design, Test, Project Presentation, Round up.

MECH 3134(5) - STRUCTURAL MECHANICS AND DYNAMICS 2 (L/P - 3.5) (PQ: MECH 2228(3))
Bending Stresses; Complex Stress and Strain; Elastic Constants; Volumetric Strain; Theories of Failure; Cams; Governors; Clutches; Spur Gearing.

MECH 3137(5) - QUALITY AND RELIABILITY 1 (L - 3)
Principles of Quality Assurance, Relation to Design, Development, Manufacturer and User Products and Services. Management Aspects of Reliability, Basic Statistics, Reliability Engineering.

MECH 3238(5) - ENGINEERING MAINTENANCE (L/P - 3)

Concepts and Horizons of Maintenance, Maintenance of Plant facilities, Maintenance of Mechanical Service Equipment and Electrical Equipment, Maintenance Techniques, Computerised and Conventional Maintenance Management Systems, Maintenance Costs and Costs Controls.

MECH 4000(5) - DEGREE PROJECT (P - 12)

Project in Mechanical Engineering and Related Areas.

MECH 4055(5) - REFRIGERATION & AIR CONDITIONING (L - 3)

Air Conditioning, p-h, T-S, p-v and psychrometric charts, Vapour Compression Cycle and System Analysis, Equipment: Compressors, Evaporators, Condensers, Throttle Valves, Refrigerant and the Ozone Layer, Air Conditioning for Tropical Climates, Air quality and Standards, Determination of Cooling Load, Air Conditioning Systems. Design of Ducting and Piping Systems. Installation, Commissioning and Maintenance of Refrigeration Equipment, Thermal Storage Systems.

MECH 4151(5) - STRUCTURAL MECHANICS AND DYNAMICS 3 (L/P - 3.5) (PQ: MECH 3134(5))

Thick Cylinders, Springs, Torsion of No Circular and Thin Walled Sections; Unsymmetrical Bending, Gear Trains, Gyroscopes.

MECH 4152(5) - AUTOMOTIVE SYSTEMS (L - 3)

Engine, Fuel, transmission, Suspension and Braking Systems, Chassis and Body Shell, Electrical and Electronic Vehicle Applications, Engine management and Exhaust Systems, Overall maintenance Schedules, Environmental Issues, Noise, Air Pollution, Road Wear, Safety, Congestion Developments in Electronic systems, New Materials.

MECH 4153(5) - HEAT TRANSFER 2 (L - 3) (PR: MECH 3130(5))

Steady State Conduction with Generation, Internal Flow, Radiation Exchange, Heat Exchangers and Heat Pipes, Boiling and condensation, Combined Modes of Heat Transfer.

MECH 4154(5) - THERMAL SCIENCE 2 (L - 3) (PR: MECH 2226(3))

Turbomachinery, Psychrometry, Condensers and Cooling Towers, Internal Combustion Engines: Performance Testing.

MECH 4256(5) - ENGINEERING MANAGEMENT 2 (L - 3)

Human Resource Management: Evolution of Management, Types of leadership, Motivation, Recruitment, Training and Development, Evaluation, Control and Reward System; Industrial Relations & Law: Industrial

Disputes and Discipline, Workers bargaining power and participation; Introduction to Marketing: The marketing Environment, Customer buying behaviour, Segmentation, Targeting and Positioning, The 4 P's of Marketing; Contracts & Tendering.

MECH 4257(5) - ENERGY MANAGEMENT (L - 3) (PR: MECH 4154(5))

Fuel and Combustion, Boilers, Efficiency; Total Energy Schemes, Case Studies.

MECH 4258(5) - STRUCTURAL MECHANICS AND DYNAMICS 4 (L - 3)

Strains Beyond Elastic Limit; Rings, Discs, Cylinders subjected to Rotation and Thermal Gradients, Circular Plates and Diaphragms, Experimental Stress Analysis; Vibrations.

TXT 3171(3) - TEXTILE MACHINERY

Yarn Preparations prior to Weaving. Weaving Motion. Conventional and Modern Weaving Machines. Fabric Draw-off. Woven Structures. Loop formation. Flat and Circular Knitting Machines. Basic Fabrics. Production Calculation. Main Routes in Textile Technology. Evolution of Yarn Processing Technology. Opening, Cleaning and Blending. Carding. Drawing and Spinning. Production Calculations. Industrial Survey.