



VARSITY INSTITUTE OF SCIENCE AND TECHNOLOGY

Empowering through science and technology

FACULTY OF ENGINEERING SCIENCE

Engineering Module Description

ENGINEERING SCIENCE: is a multidisciplinary that emphasizes enhanced understanding and integrated application of engineering, scientific, and mathematical principles. The subject is unique because it provides a broad foundation in the sciences and associated mathematics that underlie engineering and provides students the opportunity to obtain a depth of knowledge in an area of their choosing through technical electives and a program thesis. The curriculum is designed for students who seek to link the engineering disciplines with science.

MATHEMATICS: The study of the measurement, relationships, and properties of quantities and sets, using numbers and symbols. Arithmetic, algebra, geometry, and calculus are branches of mathematics. Analytical and quantitative skills are sought by a wide range of employers. Mathematics provides you with a broad range of skills in problem solving, logical reasoning and flexible thinking. This leads to careers that are exciting, challenging and diverse in nature. Mathematics provides you with particularly good job prospects

ENGINEERING DRAWING: a type of technical drawing is used to fully and clearly define requirements for engineered items. Engineering drawing (the activity) produces engineering drawings. More than merely the drawing of pictures, it is also a language—a graphical language that communicates ideas and information from one mind to another. Most especially, it communicates all needed information from the engineer who designed a part to the workers who will make it.

MECHANOTECHNOLOGY: is the application of engineering principles and technological developments to the creation of useful machinery or products. This course is designed to develop the skills for learners that are studying toward an artisanship in the mechanical, engineering and related technology fields and to assist them to achieve their full potential in an engineering career.

DIESEL/MOTOR: trade theory Covers repair and overhaul mechanical parts such as engines, transmissions and suspension systems. Motor Mechanics service and repair petrol engine vehicles, however some specialise in diesel engines. Ability to work with hand tools, ability to

read and interpret technical information, problem solving skills, communication skills, enjoy practical and manual activities.

BUILDING & CIVIL TECHNOLOGY: This program covers all phases of the engineering process related to planning, design, construction, operation, assessment and rehabilitation are covered, and different engineering roles relevant for the field are demonstrated. The aim of the programme is to provide knowledge and skills for a professional career within the fields of structural engineering and building technology.

Building science: is the collection of scientific knowledge and experience that focuses on the analysis and control of the physical phenomena affecting buildings and architecture. It traditionally includes the detailed analysis of building materials, building envelope, heating, ventilation and air conditioning systems, natural and electrical lighting, acoustic, indoor air quality, passive strategies, fire protection, and renewable energies in buildings. **Building drawing:** Is a form of technical drawing that covers the creating of accurate representations of objects, buildings or houses for technical, architectural or engineering purposes.

ELECTRICAL TRADE THEORY: generally deals with the study and application of electricity, electronics, and electromagnetism. It also covers power, control systems, telecommunications and signal processing. **Industrial electronics:** This program is concerned with large-scale electrical systems such as motor control and power transmission, as well as utilizing electricity to transmit energy.

ELECTROTECHNOLOGY/ELECTROTECHNICS: generally deals with the study and application of electricity, electronics, and electromagnetism. It also covers power, control systems, telecommunications and signal processing. The study or science of practical and industrial applications of electricity. **Building administration:** This program covers all phases of the engineering process related to planning, design, construction, operation, assessment, administrative purposes and rehabilitation are covered

QUANTITY SURVEYING: This program looks at all costs relating to building and civil engineering projects, from the initial calculations to the final figures. It seeks to minimise the costs of a project and enhance value for money, while still achieving the required standards and quality.

BUILDING & STRUCTURAL CONSTRUCTION: this program looks at the structural designing of foundations, Bonds in Brickwork, Damp Proofing, Steel Doorframes and Windows Arches: Brickwork, Roof Covering, Guttering, Ceilings,

STRUCTURAL STEELWORK: Bolted, Riveted and Welded. **Building & structural surveying:** is the technique and science of accurately finding out the position of points and the distances and angles between them. These points are usually, but not always, associated with positions on the surface of the Earth. They are often used to make land maps and boundaries for ownership of land. **Fluid mechanics:** is the branch of physics which involves the study of fluids (liquids,

gases, and plasmas) and the forces on them. Fluid mechanics can be divided into fluid statics, the study of fluids at rest; and fluid dynamics, the study of the effect of forces on fluid motion.

STRENGTH OF MATERIALS: is a subject that deals with the behaviour of solid objects subject to stresses and strains. It often refers to various methods of calculating the stresses and strains in structural members, such as beams, columns, and shafts. The methods employed to predict the response of a structure under loading and its susceptibility to various failure modes takes into account the properties of the materials such as its yield strength, ultimate strength.

MECHANICAL DRAWING AND DESIGN: This subject prepares students through courses in engineering drawings, manufacturing, CADD, dimensioning and solid modelling. It places heavy emphasis on mathematics because mechanical drafters must be extremely precise in their plans, detailing exact measurements and assembly methods for a product.

POWER MACHINE: also known as thermodynamics is a branch of physics concerned with heat and temperature and their relation to energy and work. It defines macroscopic variables, such as internal energy, entropy, and pressure that partly describe a body of matter or radiation.

FITTING & MACHINING: This subject covers the use and application of skills relevant to fitting and turning. This includes the setting up of work pieces and machines to perform shaping and plane operations, the use of automated machine tools and the meeting of engineering drawing specifications. The subject also focuses on gear cutting and boring operations, as well as the design, fault-finding and maintenance and repairs of gears.

WATER TREATMENT PRACTICE: is, collectively, the industrial-scale processes that make water more acceptable for an end-use, which may be drinking, industry, or medicine. Water treatment is unlike small-scale water sterilization that campers and other people in wilderness areas practice. Water treatment should remove existing water contaminants or so reduce their concentration that their water becomes fit for its desired end-use, which may be safely returning used water to the environment. The processes involved in treating water for drinking purposes to provide a safe source of water supply may be solids separation using physical processes such as settling and filtration, and chemical processes such as disinfection and coagulation.

CHEMISTRY: is a branch of physical science that studies the composition, structure, properties and change of matter. Chemistry deals with such topics as the properties of individual atoms, how atoms form chemical bonds to create chemical compounds, the interactions of substances through intermolecular forces that give matter its general properties, and the interactions between substances through chemical reactions to form different substances.

PLANT OPERATION THEORY: This subject covers physical plants, mechanical plant or industrial plant and the necessary infrastructure used in support and maintenance of a given facility. The operation of these facilities, or the department of an organization which does so, is called "plant operations" or facility management.

PLUMBING THEORY: In this subject different drainage systems will be explained. Floor drains, funnel floor drains, priming methods and venting exceptions are discussed. Various plumbing traps and types, sizing, trap seal loss and fixture outlet pipes are explained. Sizing the drainage system and grading or sloping according to code will be shown. Venting of the drainage system according to acceptable practice and code will be discussed and demonstrated in this course. Types of individual vents, branch vents with pertinent rules and sizes are stressed. Group vents, dual vents, wet vents, and circuit vents are explained in depth. Roof flashings and vent terminals are discussed at length.

CHEMICAL PLANT OPERATION: This covers industrial process plant that manufactures (or otherwise processes) chemicals, usually on a large scale. The general objective of a chemical plant is to create new material with the use chemical or biological transformation and or separation of materials. Chemical plants use specialized equipment, units, and technology in the manufacturing process. Physical plant, mechanical plant or industrial plant and the necessary infrastructure used in support and maintenance of a given facility. The operation of these facilities, or the department of an organization which does so, is called "plant operations" or facility management.

CHEMICAL TECHNOLOGY: Chemical technologists are involved in quality control testing, environmental analysis, product R&D and more. You could work in a variety of settings— industrial plants to commercial and government labs. The mining and resource sectors are big employers, but you'll also find opportunities in agriculture, food, forestry, health and manufacturing.

BRICKLAYING & PLASTERING: Bricklayers and plasterers are usually the first tradesmen employed on a building project where they are responsible for the building of the inner and outer walls of the building as well as the finishing of these structures. The bricklaying and plastering trade is one of the oldest trades in the building industry and has not changed much since the early days.

The material used has developed and changed to a great extent still consists mostly of placing bricks and blocks on top on one another whilst following the three rules of plumb, level and straight. Plastering comprises the artistic and functional covering and finishing of the interior and exterior walls of building according to specifications and design. Bricklayers are skilled journeymen who construct and repair walls, partitions, steps, free standing piers, arches, fireplaces and other structures made of brick, concrete block or masonry materials.

They may specialize in one type of masonry material such as firebrick or cinder block work. Bricklayers first study the blueprints or building plans to check specifications and determine the most accurate layout. Mortar is then mixed and a layer or bed of mortar is spread as a base, after which bricks are positioned by hand to assure a neat, uniform appearance. Excess mortar is cut off. Mortar joints are then finished off so that moisture cannot penetrate.



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