

DEPARTMENT OF TECHNOLOGY

FACULTY

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PHILOSOPHY

In recognition of Jesus Christ as the Master Craftsman, the purpose of technology studies in a Seventh-day Adventist Institution is to train students to use their hands, head and heart in applying science and technology to serve the noble goals of mankind. Society is becoming increasingly more dependent on technology for transport, communication, information processing, manufacturing etc. It is in these areas that the department will make significant contributions.

MISSION

To train students to diligently apply scientific principles in finding solutions to the challenges facing society in an ever-changing world, and to produce quality graduates prepared to use their hands, head and heart in service to God and mankind.

VISION

To be the leading department in providing world-class programs in Automotive technology, Electronics technology and building construction.

OBJECTIVES

Programmes in the Department of Technology are designed to:

1. Prepare students to teach technological oriented courses in secondary and technical institutes in the fields of Automotive Technology, Building Construction Management, Computing, Drafting, Electrical, Electronics, Software Development, Welding and Wood Technology.
2. Provide the education and training necessary to become entrepreneurs in various fields of Technology.
3. Equip students with the requisite technical skills needed for employment in industry and institutions.
4. Prepare students for the rigors of postgraduate studies.

5. Inculcate the basic principles of practical Christianity such as honesty, dignity of work, and respect of authority and government.
6. Provide an academic environment that emphasizes and advocates critical thinking and research.
7. Foster collaboration with other institutions and industries.

DEGREES OFFERED BY THE DEPARTMENT

1. Bachelor of Science in Technology (Automotive)
2. Bachelor of Science in Technology (Electronics)
 - a) Communication Option
 - b) Industrial Option
3. Bachelor of Technology in Automotive
4. Associate degree in Building Construction
5. Associate degree in Electronics

CAREER OPPORTUNITIES

1. Automotive Technologists qualify for management positions in customer relations, credit and finance, personnel, sales, marketing, inventory control and fleet manager. They find employment as field service engineers, serviceability engineers, diagnostic tool and service manual developers, dealer development managers, warranty auditors, or automotive technology instructors.
2. Electronics Technologists work as members of "engineering teams" in applied design, product development, installation, maintenance, manufacturing production, or operations. They find employment in technical services including field engineering, customer support, marketing, and sales, in semi-conductor industries, in the fields of radio, television, telephone, and data communication, and as electronics technology instructors in technological colleges and technical institutes.
3. Associate degree graduates work as technicians in electronics or semi-conductor companies, service technicians or may become repair shop entrepreneurs.
4. Associate degree in Building Construction Management graduates qualify for positions leading to supervisor, contractor, construction technician, or construction superintendent. They may find employment as material handlers, construction estimators, lumber sales representatives, or project managers.

ENTRANCE REQUIREMENTS

a) Direct Entry

In addition to meeting University minimum entrance requirements, students entering the Department of Technology must have at least a C+ in mathematics and physics.

b) Interdepartmental Transfer

All students wishing to transfer to Technology must attain a minimum grade of C+ in MATH 171 or MATH 191, and PHYS 151. In addition, the students must officially transfer before they are allowed to take upper division Technology course levels of 300 and

above.

GRADUATION REQUIREMENTS

1. A minimum of 164-167 credits of required courses and upon completion of the subject listed.
2. An overall cumulative GPA of 2.00 is required to graduate.
3. A GPA of 2.25 is required for the Concentration and the Core. A minimum grade of C for each course in the Concentration and the Core is required.

BACHELOR OF SCIENCE IN TECHNOLOGY (BST) AUTOMOTIVE

SUMMARY

General Education	40 Credits
Core	38 Credits
Concentration	48 Credits
Cognates	<u>32</u> Credits
Total	158 Credits

COURSE LISTING

General Requirements for Technology Students

A. General Education Requirements **40 Credits**

Automotive and Electronics majors are exempted from the following courses from the General Requirement section.

INSY 107	Information Technologies for Today	2
MGMT 103	Basic Management and Entrepreneurial skills	2
MATH 101	Pre –Calculus	3

B. Core Courses **38 Credits**

A minimum grade of C be attained at the prerequisite level in all Technology courses before one can register for the next level.

AUTO 114	Power Technology	2
COMP 130	Software Applications in Technology	3
ELCT 111	Fundamentals of Electronics	4
MECT 131	Technical Drawing	2
MTLS 242	Welding Technology	2
TCED 141	Engineering Materials	2
TCED 220	Safety Education	2 or
TCED 260	Industrial Safety	2
TCED 235	Philosophy of Technical Education	2
TCED 281	Practicum in Technology I	1
TCED 325	Technology Entrepreneurship	2

TCED 350 Industrial Economy	3
TCED 381 Practicum in Technology II	1
TCED 400 Attachment in Industry	3
TCED 441 Senior Project I	2
TCED 442 Senior Project II	2
TCED 462 Thermodynamics	3
WOOD 181 Bench Woodworking	2

C. Concentration 48 Credits

AUBO 111 Fundamentals of Auto Body Repair	3
AUBO 112 Auto Body Refinishing I	3
AUBO 211 Major Panel Repair	3
AUBO 311 Major Collision Repair	3
AUBO 312 Auto Body Refinishing II	2
AUTO 211 Automotive Engines I	3
AUTO 212 Automotive Engines II	3
AUTO 221 Automotive Electricity	3
AUTO 231 Automotive Air-conditioning	2
AUTO 311 Automotive Diesel	3
AUTO 321 Drive Trains and Suspension	4
AUTO 411 Engine Performance I	3
AUTO 412 Engine Performance II	3
MTLS 342 Workshop Practice	2
TCED 200 Introduction to Fluid Mechanics	2
TCED 250 Machine and Tool Maintenance	3
TCED 335 Fleet Management	2
TCED 454 Shop Planning and Organization	1

D. Cognates 32 Credits

ACCT 110 Bookkeeping and Accounting	2
CHEM 121 General Chemistry I	3
MATH 191 Engineering Mathematics I	3
MATH 192 Engineering Mathematics II	3
MATH 193 Engineering Mathematics III	3
MATH 292 Engineering Mathematics IV	3
MGMT 230 Fundamentals of Management	3
MGMT 330 Human Resource Management	3
MGMT 355 Management and Organization	3
PHYS 151 General Physics I	3
STAT 201 Statistics I	3

BACHELOR OF TECHNOLOGY (BT) AUTOMOTIVE

SUMMARY

General Education	40 Credits
Core Courses	38 Credits
Concentration	46 Credits
Cognates	35_Credits
Total	159_Credits

C. Concentration **46 Credits**

AUBO 111 Fundamentals of Auto Body Repair	3
AUBO 112 Auto Body Refinishing I	3
AUBO 211 Major Panel Repair	3
AUBO 311 Major Collision Repair	3
AUBO 312 Auto Body Refinishing II	2
AUTO 211 Automotive Engines I	3
AUTO 212 Automotive Engines II	3
AUTO 221 Automotive Electricity	3
AUTO 311 Automotive Diesel	3
AUTO 321 Drive Trains and Suspension	4
AUTO 411 Engine Performance I	3
AUTO 412 Engine Performance II	3
MTLS 342 Workshop Practice	2
TCED 200 Introduction to Fluid Mechanics	2
TCED 250 Machine and Tool Maintenance	3
TCED 335 Fleet Management	2
TCED 454 Shop Planning and Organization	1

D. Cognates **35 Credits**

ACCT 111 Fundamentals of Accounting I	3
CHEM 121 General Chemistry I	3
MATH 191 Engineering Mathematics I	3
MATH 192 Engineering Mathematics II	3
MGMT 230 Fundamentals of Management	3
MGMT 330 Human Resource Management	3
MGMT 341 Business Law I	2
MGMT 455 Management and Organization	3
MGMT 475 Operations Management	3
MKGT 310 Principles of Marketing	3
PHYS 151 General Physics I	3
STAT 201 Statistics I	3

BACHELOR OF SCIENCE IN TECHNOLOGY (BST) ELECTRONICS

SUMMARY

General Education	40 Credits
Core Courses	38 Credits
Concentration Communication Option	55 Credits
Concentration Industrial Electronics Option	57 Credits
Cognates	26 Credits
Total	149-162 Credits

C. Cognates **26 Credits**

ACCT 110 Bookkeeping and Accounting	2
CHEM 121 General Chemistry I	3
MATH 191 Engineering Mathematics I	3
MATH 192 Engineering Mathematics II	3
MATH 193 Engineering Mathematics III	3
MATH 292 Engineering Mathematics IV	3
MGMT 230 Fundamentals of Management	3
PHYS 151 General Physics I	3
STAT 201 Statistics I	3

D. Concentration **37 Credits**

COMP 311 Digital Integrated Circuits	4
COMP 332 Networking and Web Development	3
CMMT311 Analog and Digital Filters	3
ELCT 121 Solid State Devices and Circuits	4
ELCT 231 Operational Amplifiers and linear IC's	4
ELCT 311 Electronics Fabrication	2
INEL 202 Instrumentation and Measurements	2
INEL 211 Electrical Machines	3
INEL 222 Electrical Installation & Costing	3
MECT 236 Electrical and Electronic Drawing	2
SDEV 211 Software Engineering Principles	2
SDEV 222 Object-Oriented Analysis & Design	2
SDEV 331 Object-Oriented Program in Java	3

1. Communication Option **18 Credits**

CMMT 382 Television Circuits	3
CMMT 401 Communication Principles	3
CMMT 402 Digital RF Systems and Circuits	3
CMMT 412 Prin. of Telecom & Packets Networks	3

CMMT 422 Mobile and Satellite Communications	3
CMMT 481 Sound and Video Production	3

2. Industrial Electronics Option 21 Credits

COMP322 Introduction to Computer Hardware	2
INEL 331 Control I	3
INEL 332 Control II	3
INEL 341 Power Systems	3
INEL 420 Ind. Electronic Devices and Machine Drives	4
INEL 462 Programmable Logic Controllers	3
INEL 470 Mechatronics	3

ASSOCIATE DEGREES

A. General Education Requirements 25 Credits

See details under the General Education section of the Bulletin. However, Electronics majors take COMP 130 in place of INSY 107

ASSOCIATE DEGREE (ASC) IN ELECTRONICS

SUMMARY

General Education	25 Credits
Core Courses	10 Credits
Concentration	30 Credits
Cognates	11 Credits
Total	76Credits

B. Core Requirements 10 Credits

MECT 131 Technical Drawing	2
TCED 221 Associate Project I	1
TCED 222 Associate Project II	1
TCED 235 Philosophy of Technical Education	2
TCED 260 Industrial Safety	2
TCED 281 Practicum in Technology I	1
TCED 282 Practicum in Technology II	1

C. Cognates 11 Credits

ACCT 110 Bookkeeping and Accounting	2
CHEM 121 General Chemistry I	3
MATH 191 Engineering Mathematics I	3
PHYS 151 General Physics I	3

D. Concentration 30 Credits

CNST 265 Construction Technology Practice I	2
CNST 270 Construction Management	2
CNST 285 Building Finishing	2
CNST 292 Construction Law	2
ELCT 105 Fundamentals of Electricity	2
MECT 275 Architectural Drawing I	3
MTLS 243 Welding II	2

COURSE DESCRIPTIONS

AUTOMOTIVE TECHNOLOGY

AUBO 111 Fundamentals of Auto Body Repair 3

Credits

An introduction to the basic theory and repair procedures of late model automobile body structures. Appropriate welding and hand tool skills are developed on mock-ups, before work is done on damaged cars. One lecture hour and two 3-hour laboratory per week.

Prerequisite: MTLS 143.

AUBO 112 Auto Body Refinishing I 3 Credits

A study of the fundamentals of spray equipment and materials and their application in surface preparation. Special emphasis in the refinishing materials and procedures for spot refinishing and complete paint jobs using lacquer, enamel or acrylic finishes. One lecture hour and Two 3-hour laboratories per week. *Prerequisite: AUBO 111.*

AUBO 211 Major Panel Repair 3 Credits

Further study and skill development on sectioning and panel repair, component alignment, fixed and movable glass replacement and preparation for final finish. One lecture hour and two 3-hour laboratories per week. *Prerequisite: AUBO 112.*

AUBO 311 Major Collision Repair 3 Credits

A study of major repair covering skills, tools, heavy equipment, frame alignment within accepted tolerances and standards, and estimating. Emphasis is given in panel replacement, clipping, and auto frame straightening. One lecture hour and two 3-hour laboratory per week.

Prerequisite: AUBO 211

AUBO 312 Auto Body Refinishing II 2 Credits

Further study in automotive refinishing. Emphasis on advanced spray-gun technique for custom finishes with stripping, taping, air brush, metal flakes, and gold leaf. One lecture hour and one 2-hour laboratory per week. *Prerequisite: AUBO 112.*

AUTO 100 Personal Auto Care**1 Credit**

Stressing the need for proper procedures in routine automobile maintenance. Helping the automobile owner become a wise consumer with emphasis on how to do simple tune-up, maintenance, and minor repairs. Not applicable to an automotive major or minor. One lecture hour and one 3-hour laboratory per week.

AUTO 110 Automobile Driving**1 Credit**

This course aims at providing knowledge and skills in automobile driving. Emphasis is given to safe driving habits and an understanding of the Highway Code. One lecture hour and two hours of practical driving sessions per week.

AUTO 114 Power Technology**2 Credits**

A study of power sources and the ensuing problems of power transmission utilization. Internal combustion principles are applied to small gasoline engines. One lecture hour and one 3-hour laboratory per week.

AUTO 211 Automotive Engines I**3 Credits**

A study of automotive engine fundamentals. Emphasis is given to design as well as cooling, lubrication, and the accessory system. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: AUTO 114.*

AUTO 212 Automotive Engines II**3 Credits**

Further study in the theory and comprehensive repair of automotive engines. Emphasis in bearing, piston, and valve problems, related accessories, and engine diagnostic procedures. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: AUTO 211.*

AUTO 221 Automotive Electricity**3 Credits**

The study of automotive electrical systems. Emphasis in cranking, charging, and electronic ignition systems, diagnostic procedures, repairs, and adjustments. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: ELCT 111, AUTO 211.*

AUTO 231 Automotive Air Conditioning**2 Credits**

A study of thermodynamics of auto air conditioning and comfort controls. Emphasis is given to inspection and repair of compressor, dryer, evaporator, condenser, and controls. One lecture hour and one 3-hour laboratory per week. *Prerequisites: AUTO 221.*

AUTO 311 Automotive Diesel**3 Credits**

A study of overall diesel principles and service, as it pertains to the automobile. Laboratory experience includes pump and nozzle disassembly and assembly, pump timing and general diesel maintenance. Two lecture hours and one three-hour laboratory per week. *Prerequisite: AUTO212.*

AUTO 321 Drive Train and Suspension**4 Credits**

Further study of automotive clutches, transmissions, transaxles, drive lines, differentials, brakes, suspension springs and shocks, steering, tires, wheel balancing and alignment. Two lecture hours and two 3-hour laboratory per week. *Prerequisite: AUTO 211.*

AUTO 411 Engine Performance I

3 Credits

A study of automotive tune-up fundamentals. Emphasis is given to fuel, electrical and air systems, with disassembly, inspection, and reassembly of distributors, ignition control devices, and carburetors. Two lecture hours and one 3-hour laboratory per week for 3 credits.

Prerequisites: AUTO 212 and AUTO 221.

AUTO 412 Engine Performance II

3 Credits

A study of fuel injection systems including throttle body, mechanical, and electronic systems. Related controls and systems are also included as part of the course. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: AUTO 411.*

BUILDING CONSTRUCTION TECHNOLOGY

CNST 102 Construction Materials

3 Credits

This course covers the basic principle of the nature, testing and classification, structure and properties of construction materials as cement, clay, metals, stones, sand, wood and other special materials. Two lecture hours and one 3-hour laboratory per week.

CNST 110 Residential Construction

3 Credits

This course covers the basic principles of residential construction including blueprint reading, plot layout and excavation, foundations and framing, exterior finishing, roof layout and application of roofing, stair layout and interior finishing. Two lecture hours and one 3-hour laboratory per week

CNST 115 Masonry Construction

2 Credits

This course covers the basic principles of masonry and concrete construction including the various types of concrete structures as footing, piers, columns, walks and driveways, along with masonry structures such as brick and block walls and foundations. One lecture hour and one 3-hour laboratory per week

CNST 130 Plumbing Construction

3 Credits

This course covers the basic principles of plumbing including design and layout of plumbing systems, rough-in methods, fixture installation, septic system layout and installation and maintenance of existing systems. Two lecture hours and one 3-hour laboratory per week

CNST 140 Home Maintenance

2 Credits

A course designed to help the future and present homeowner save on home repairs.

Emphasis is placed on maintenance, tools, supplies, and procedures followed in making home

repairs. One lecture hour and one 3-hour laboratory per week.

CNST 225 Structures I

3 Credits

An introduction to structural appreciation; external and internal forces; free body diagrams; static force equilibrium for statically determinate structures; member forces in pin-jointed trusses; beam section properties; bending moment, shear force and deflection diagrams for beams; beam stresses in bending and shear; design of steel beams for bending, shear and deflection. Case studies to illustrate how structures of various types support vertical and lateral loads are considered. Two lecture hours and one 3-hour laboratory per week.

CNST 226 Structures II

3 Credits

Principles of structural design for strength, stability and serviceability; design of steel and concrete structures using limit state design; load transfer mechanisms and failure modes in beams and columns; design of beams and columns in steel; bolted joints and welded joints in steel frame; design of reinforced concrete beams and slabs for bending, shear and deflection; reinforcement in columns, footings and other elements; reinforcement detailing; concrete bond and anchorage; durability and concrete cover; case studies of structural failures. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: CNST 225.*

CNST 236 Survey

2 Credits

Representation of land on maps and plans and vice versa. Chain surveying, linear measurements, overcoming obstacles. Principle of levelling, types of levelling instruments, contour lines, direct and indirect methods of contouring. Setting out of sewers and drainage, buildings, roads, railways; sectioning: longitudinal and cross sections. Plane table surveying: equipment and methods of surveying using compass and theodolites - principle of traversing and calculation of coordinates. Systems used in tachometry. Curves-types and setting out procedures. Determining areas and volumes from survey data. One lecture hour and one 3-hour laboratory per week.

CNST 261 Construction Management and Planning

3 Credits

Study of the fundamental activities associated with the organization and management of construction projects. Course work investigates the functions of both the general contractor and the professional manager, including planning, scheduling and expediting construction. The course includes application of computer-based scheduling and planning tools. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: CNST 102.*

CNST 264 Concrete Technology

2 Credits

This course covers the science of concrete technology, which includes the selection, mix, use and storage of materials for the production of concrete: Tests and quality control on different mixtures are covered. One lecture hour and one 3-hour laboratory per week. *Prerequisite: CNST 102.*

CNST 265 Construction Technology and Practice I**2 Credits**

Introduction to the building technology concept: in relation to development, building industry and the building team, and appropriate technology in building. Site investigation, soil investigation, assessment and testing. Site clearing, site layout considerations, site lighting and electrical supply, site office accommodation, materials storage. Principles of setting a building, including setting out, layout and excavation. Construction equipment and Building demolition. One lecture hour and one 3-hour laboratory per week.

CNST 266 Construction Technologies and Practice II**2 Credits**

To familiarize the student with basic principle of masonry, the material properties, design procedures, classification, types, special units, structural, characteristic, physical properties, color texture and code requirements for masonry. Includes class practices and field visits. One lecture hour and one 3-hour laboratory per week. *Prerequisite: CNST 265*

CNST 270 Construction Management**2 Credits**

Construction business policies and problems. Job organization and management, estimating and bidding project planning and control. Inspection procedures. One lecture hour and one 3-hour laboratory per week. *Prerequisites: 10 credits of construction. Offered only alternate years.*

CNST 285 Building Finishing**2 Credits**

This course covers construction of exterior and interior finishing for residential and commercial construction including siding, cornices, roofing, attic ventilation, and window and door installation. Drywall, installation of interior doors, window and door trim, base, hardware, suspended ceilings, closet shelving, and installation of kitchen and bathroom cabinets and counter tops for both new construction and remodeling projects. This course will be held at an on-site project location. Further superstructure, finishes, and external works: Timber, concrete and metals stairs, internal walls, partitions, plasters and plastering, curtain walling, infill panels, cladding and wall tiling. Floor finishes: screed wooden blocks, terrazzo, granolithic. Roofs: timber, steel, concrete roofs, long span, shell roof construction. Ceilings: suspended, plaster ceilings. Drainage, water supply, electrical supply, gas supply. Landscaping, fences gates and pavements. One lecture hour and one 3-hour laboratory per week. *Prerequisite: CNST 270*

CNST 292 Construction Law**2 Credits**

This course introduces the use of model building codes (BOCA, IBC, KENYA CODE) along with the state and local adaptations, reference standards, and the application of the code to structures and occupancies. Topics include construction classification, building limitations, special use and occupancy requirements, egress, fire considerations, structural, mechanical, plumbing and energy conservation requirements. The role and use of codes in design and construction is examined. Two lecture hours per week. *Prerequisite: CNST 270*

CNST 335 Quantity Survey**2 Credits**

Historical background, functions of the quantity surveyor; introduction to Kenya Standard Method of Measurement of Building Works, its importance and application; methods of recording dimensions, checking and correlating plans and specifications; principles of measurement and billing; Bill of Quantities format; elementary billing and measurement of basic trades including finishes, brickwork, woodwork, roofing, concrete and groundwork. One lecture hour and one 3-hour laboratory per week. *Prerequisite: CNST 265*

CNST 340 Soil Mechanics and Hydraulics**3 Credits**

Soil Mechanics: Geological formation of soils, soil as a 3-phase system, broad classification, cassagrandes classification, Afterberg limits, soil/moisture relationships, effective stresses, shear strength, compaction, consolidation, soil bearing capacities, Terzaghi's formulae for bearing capacities, site investigation. Tests on soils. Hydraulics: basic hydraulics, Bernoulli's Equation, orifices, notches and weirs, flow in pipes, pipe losses, hydraulic grade and total energy lines. Simple pipe design. Open channel flow Chezy's and Mannings equations surface curve types; channel design to include most economical channel sections. Two lecture hours and one 3-hour laboratory per week

CNST 389 Finish Carpentry**3 Credits**

Introduction to the methods and practices of interior and exterior finishing. Including construction and installation of door, windows, floors and cabinets. Two lecture hours and one 3-hour laboratory per week. *Prerequisites: CNST 110, WOOD 387 or Departmental Approval.*

CNST 402 Environmental Systems**2 Credits**

Study of the components and systems used to control the environment of modern buildings. This course covers plumbing, electrical, fire protection, lighting, acoustics, transportation and signaling systems, and heating and air conditioning systems required in today's buildings. This course explains how each component system contributes to the total controlled environment necessary in our sophisticated building structures. One lecture hour and one 3-hour laboratory per week. *Prerequisite: CNST 265.*

CNST 435 Construction Management Internship**2 Credits**

This course provides the student with work site experience in which skills and knowledge learned in previous courses may be applied. These internship experiences include safety procedures, concrete forming, framing, exterior trim/finish, interior trim, insulating, and drywall installation. *Prerequisite: senior building construction student in good standing.*

ELECTRICITY AND ELECTRONICS**CMMT 311 Analog and Digital Filters****3 Credits**

This course covers the principles of filters, the theory, operation and circuits of both analogue

and digital filters in relation to RF circuits. Design and coding of digital filters will be emphasized. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: ELCT 231.*

CMMT 382 Television Circuits

3 Credits

Study of television transmission and receiving principles, the theory and operation of both monochrome and color television systems. It includes antenna systems, low voltage power supplies, horizontal and vertical deflection systems, sound, picture tube, tuner, signal separator, AFC, AGC, high voltage power supply, IF circuits. Laboratory exercise will emphasize troubleshooting techniques of the systems. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: ELCT 231.*

CMMT 401 Communication Principles

3 Credits

An introductory course to communication systems and principles involving; Noise in communication systems, AM and FM principles, transmitters and receivers, multiplexing and data transmission and fiber-Optic Communications. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: ELCT 231*

CMMT 402 Digital RF Circuits and Systems

3 Credits

Design of Analog and digital RF circuits for communication circuits including broadcast TV and radio, mobile and cellular radio, transmitters and receivers, mixers, oscillators, modulators, AGC, gain distribution and IF amplifiers, Introduction to antennas and propagation, Principles of radar and sensors, Other applications of RF e.g. medicine, imaging, RFID, heating astronomy and optoelectronics spectrum management are discussed. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: CMMT 401*

CMMT 412 Principles of Telecom and Packet Networks

3 Credits

This course is organized into three modular parts: telecom, datacom and networking. These include Public Switched Telephone Network, equipment and call centers, the telecom business, carriers, digital voice transmission, T1/E1, fiber and SONET backbones, IP packets and LAN frames; modems including DSL and cable modems, digital circuits and services, muxes vs. switches vs. routers, and LANs, protocol stacks, IP addresses, bandwidth-on-demand services, Voice over IP (VoIP) and IP VPNs and the Internet. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: CMMT 402*

CMMT 422 Mobile and Satellite Communications

3 Credits

Introduction to satellite and wireless communication. Covers introduction to satellite systems, organization and planning satellite systems, state of the art review, regulations of the spectrum, Vsat business and Link Budgets, study of the 1st, 2nd, 3rd and 4th generations of mobile systems with special emphasis on GSM, UMTS, CDMA systems, wifi and Wimax systems. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: CMMT 412*

CMMT 481 Sound and Video Production

3 Credits

A study on advance color television circuit basic sound and video production and transmission, lighting technology and color adjustment and editing. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: CMMT 382*

COMP 130 Software Applications in Technology **3 Credits**

This course introduces the student to computer fundamentals and applications, concepts and tools they need for research and presentation in a technological environment. Applications include key boarding, word-processing, PowerPoint, Access, Excel, Matlab etc. One lecture hour and two 3-hour laboratory per week.

COMP 311 Digital Integrated Circuits **4 Credits**

Study of digital integrated circuits including characteristics of logic gates families and application of IC gates, clocks, counters, registers, displays, and memories and microcontroller and microprocessors. Laboratory emphasizes application of IC devices commonly used in electronic devices. Three lecture hours and one 3-hour laboratory per week. *Prerequisites: ELCT 121 and MATH 192.*

COMP 322 Introduction to Computer Hardware **2 Credits**

An introduction to computer component selection and application. Topics include motherboards, video cards, memories, storage devices, BIOS input/output devices, modems, printers, and network cards. One lecture hour and one 3-hour laboratory per week. *Prerequisite COMP 311.*

COMP 332 Networking and Web Development **3 Credits**

Strategies, Database, developing server applications, software, design, management and security concerns. Client-server interactions, application layer protocols, TCP/IP protocol suite. Creating WWW sites, documents and programmes. Two lecture hours and one 3-hour laboratory per week. *Prerequisite COMP 130*

ELCT 100 Basic Electronics Maintenance **1 Credit**

This is a course in basic maintenance of electronic equipment and computers. The course covers principles of basic electronic circuits, electronic devices and maintenance of electronic equipment and computers. One lecture hour and one 3-hour laboratory per week. Credits earned in this course do not count for electronics majors and minors.

ELCT 105 Fundamentals of Electricity **2 Credits**

Designed to acquaint the student with the basic theory of electricity as well as practical aspects of commercial power generation and distribution, and the commercial and domestic uses of electricity. One lecture hour and one 3-hour laboratory per week.

ELCT 111 Fundamentals of Electronics **4 Credits**

Study of the fundamentals of electronics technology: including Ohm's Law, Kirchoff's laws,

series and parallel DC resistive circuits, capacitive and inductive AC circuits. Develops circuit concepts, theorems, and analysis techniques in DC and AC circuits, with a study of RC, LC, RLC circuits, how RC and RL circuits are used as filters, pulse responses in reactive circuits, and the basic principles of integrators and differentiators. Laboratory work emphasizes the use of basic electronic test equipment. Three lecture hours and one 3-hour laboratory per week.

ELCT 121 Solid State Devices and Circuits

4 Credits

Introduction to solid-state devices including diodes, bipolar junction transistors and special diodes, an introduction to the field effect transistors and MOSFETs in power amplification. Emphasis in the design and application of these semiconductor devices. Transistor biasing schemes, and transistor amplifier configurations are discussed. Emphasis will be given to the design and application of circuits using these devices in power supplies and as small signal and power amplifiers. Three lecture hours and one 3-hour laboratory per week.

Prerequisite: ELCT 111.

ELCT 231 Operational Amplifiers and Linear IC's

4 Credits

Study of basic power, differential and operational amplifier circuits. electronic circuits such as regulated power supply, switching power supplies, filter circuits, oscillators, resonant circuits, mixers etc. Special emphasis will be placed on the uses of the operational amplifier and the various applications, as they are used in electronics circuits. Three lecture hours and one 3-hour laboratory per week. *Prerequisite: ELCT 121.*

ELCT 311 Electronics Fabrication

2 Credits

Individualized study in the techniques of electronics fabrication, including chassis construction, printed circuit board construction, and electrical packaging. The practical application of fabrication and construction techniques is demonstrated by the student building an electronic project. Emphasis will be placed on layout, testing, and finishing the selected project. One lecture and one 3-hour laboratory per week. *Prerequisite: COMP 311, ELCT 231 and MECT 236*

ELCT 391 Alternative Energy Sources

3 Credits

This course provides education and practical training in renewable energy and related topics with emphasis on electricity generation and its utilization especially in rural areas. Solar power, wind power, water power, biomass and their rural applications will be covered. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: Departmental Approval.*

INEL 202 Instrumentation and Measurements

2 Credits

This course is about electronic instruments and how to carry out measurements using these instruments. It addresses the concepts and principles of measurement, focusing on the need to be knowledgeable and adept in types of instruments available and the variables they measure, emphasis is on the different transducers used and their applications. One lecture

hour and one 3-hour laboratory per week. *Prerequisites: ELCT 231, COMP 311*

INEL 211 Electrical Machines

3 Credits

DC Machines: Magnetic Circuit, Winding terminology, types of windings, construction and e.m.f equation. Equivalent coupled circuits for electrical and energy conversion. Motors and generators: performance, characteristics and testing. DC motor: speed control, selection for particular drives and braking methods. Transformers: Coupled circuits and two winding transformers. Equivalent circuits and phasor diagrams of single phase transformers. Transformer maximum efficiency and regulation. Micromachines: DC servomotors and induction servomotors, Synchronous motors, Generators, Universal commutator motor, stepper motor, Linear induction motor, induction voltage regulator (1-phase, 3-phase). Two lecture hours and one 3-hour laboratory per week. *Prerequisite: ELCT 111*

INEL 222 Electrical Installation and Costing

3 Credits

Electrical practices including International code requirements, design and layout of electrical circuits, wiring methods, and commercial applications. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: INEL 211*

INEL 331 Control I

3 Credits

This is a study of linear control and includes basic principles of control system modelling, response, Laplace transforms, dynamic system models, block diagram models steady-state errors and stability. Lab excises make use of Matlab. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: MATH 292*

INEL 332 Control II

3 Credits

This is a second course in linear control including root locus analysis, controllers, frequency response, system hardware, control of discrete processes, direct digital control and the z-transform. A design project is included to practice the principles learned. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: INEL 331*

INEL 341 Power Systems

3 Credits

Develops an understanding of Economics of Power Generation, generating machinery, excitation systems, auxiliary supplies, overhead lines, underground cables and the power system layout and control. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: INEL 332*

INEL 420 Industrial Electronic Devices and Machine Drives

4 Credits

Power devices: MOSFETs, SCR-thyristors, power diodes, IGBT, Power transistors. 1 and 3 phase half and full wave rectifiers with reactive and active loads. Power conversion using switch modulation. Switching diodes and thyristors. AC-DC converters, AC-AC converter, DC-DC converter. DC power supply system with reversible power choppers, inverters: resonant, pulse width modulation types. I/O Harmonic contents, Protection circuits, UPS, Feedback

design DC and AC machine drives/electronic systems. Three lecture hours and one 3-hour laboratory per week. *Prerequisite: ELCT 331*

INEL 462 Programmable Logic Controllers **3 Credits**

The course covers basic concepts and applications of programmable logic controllers using ladder logic and relay diagrams. The contents are; Programmable logic controllers overview, Logic operations, the processor unit and memory, programming tools, The I/O system, PLC language, Ladder logic programming and applications, Communications, Sizing and selection of PLCs and Installation and diagnostics. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: INEL 332.*

INEL 470 Mechatronics **3 Credits**

An overview of mechanical, electrical, electronics, optical, and control technologies for system integration. Topics include: intelligent products and processes; design methodology; system modelling; sensors and actuators; microcontrollers; knowledge-based control. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: INEL 462*

SDEV 211 Software Engineering Principles **2 Credits**

The first course in software engineering introduces principles of modern software design including software process, system engineering, requirements engineering, analysis and design models, architectural design, component level design, user interface and testing strategies. One lecture hour and one 3-hour laboratory per week. *Prerequisite: COMP 130*

SDEV 222 Object-Oriented Analysis and Design **2 Credits**

The course covers software analysis and design methods, requirements analysis and modelling, object interaction, specifying operations and control, system architecture and design, patterns, human-computer interface, designing boundary classes and data management design. UML case tools are used in the design. One lecture hour and one 3-hour laboratory per week. *Prerequisite: SDEV 211*

SDEV 331 Object Oriented Programming in Java **3 Credits**

Java is one of the fast evolving Object Oriented programming languages. This course covers Java Applications, Classes and Objects, Control Statements, Methods, Arrays, Classes and Objects, Object-Oriented Programming: Inheritance, Polymorphism and GUI. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: SDEV 222*

DRAFTING TECHNOLOGY

MECT 131 Technical Drawing **2 Credits**

The fundamentals of drawing as applied to mechanical engineering problems. Orthographic projections, auxiliary and sectional views shape, and size description, isometric view,

sketching and details drawing, with an introduction to computer-aided drawing. One lecture hour and one 3-hour laboratory per week.

MECT 132 Mechanical Drawing I

2 Credits

Layout of gears and cams, interpretation and drawing of weld symbols. Principles of descriptive geometry. One lecture hour and one 3-hour laboratory per week. *Prerequisite: MECT 131.*

MECT 133 Mechanical Drawing II

2 Credits

Limit dimensioning and pipe representation. Production drawings and computer drafting. One lecture hour and one three-hour laboratory per week. *Prerequisite: MECT 132.*

MECT 236 Electrical and Electronic Drawing

2 Credits

Study of the basic concepts and techniques of electrical and electronic circuits, including schematic diagrams, block diagrams, logic diagrams, component and assembly drawing, printed circuit layout and art work using software. One lecture hour and one 3-hour laboratory per week. *Prerequisite: MECT 131. ELCT 111*

MECT 275 Architectural Drawing I

3 Credits

Presentation drawings: Floor plans, pictorial views and elevations and sections of buildings including positions of rooms and sizes, doors, windows, fire places, closets and other features of the building. Relationships of the rooms with one another. Symbols used for presentation of floor-plan drawings including electrical installation layout. Working drawings: basement plans, typical sections through buildings of various materials, elevations, dimensioning. Basic living, kitchen and bedroom layouts. Freehand sketches. Pictorial. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: MECT 131*

MECT 276 Architectural Drawing II

3 Credits

Conceptual planning and design of a large-scale architectural project responding to the social and cultural context of the environment. Employing team research and analysis leading to the design and presentation on individual solutions with graphic and three-dimensional techniques. One lecture hour and two 3-hour laboratories per week. *Prerequisite: Senior standing in Technology or Departmental Approval..*

METALS TECHNOLOGY

MTLS 242 Welding Technology

2 Credits

A basic course designed to introduce the student to welding processes. The student will learn about metals and metal preparation and develop skills to weld various joints in various positions. The course will include an introduction to shielded arc welding. One lecture hour and one 3-hour laboratory per week. *Prerequisite TCED 141*

MTLS 342 Workshop Practice**2 Credits**

A study of metal products fabrication which includes welding, bending, shaping and milling, or forging. One lecture hour and one 3-hour laboratory per week. *Prerequisite: MTLS 242*

GENERAL TECHNOLOGY COURSES**TCED 141 Engineering Materials****2 Credits**

This course is designed to study the structures and properties of the metals ceramics, polymers, composites, and electronics materials. It includes mechanical testing and behaviour, heat treating, degradation and processing of metals. One lecture hour and one 3-hour laboratory per week.

TCED 200 Fluid Mechanics**2 Credits**

This course is an introduction to the basic phenomena and principles of fluid flow. This includes fluid properties, statics, conservation of mass momentum and energy. With emphasis on quantitative analysis of velocities, pipe flow and overflow and viscous fluid flow. One lecture hour and one 3-hour laboratory per week. *Prerequisite: Math 191, Math 192.*

TCED 220 Safety Education**2 Credits**

A basic course in safety and the fundamentals of accident prevention in schools, school laboratories, workshops and industrial application. Accident statistics and resource information, legal responsibilities of teachers safety requirements in relation to equipment, and environmental conditions are studied. This course is designed to meet the legal obligations placed on teachers for accident prevention and safety precautions. Two lecture hours per week..

TCED 221 Associate Project I**1 Credit**

A project made representing his/her major area of interest and ability. The course involves title defence and project proposal defence. The work is to be supervised by assigned departmental faculty. The project should reflect the student's level of competence and incorporate a variety of skills and originality. *Prerequisite: Must have 20 credits in major area.*

TCED 222 Associate Project II**1 Credit**

Implementation of the approved proposed project in TCED 221. A final defence of the implemented project is required. *Prerequisite: TCED 221*

TCED 235 Philosophy of Technical Education**2 Credits**

A study of the underlying philosophy of education including General Education, technical education, and principles of Christian education. Special emphasis will be placed on the philosophy of technical education and how it relates to general education and the application of Christian education. Two lecture hours per week.

TCED 250 Machine and Tool Maintenance**3 Credits**

A study and practical application of the principles and procedures followed in routine maintenance and repair of tools and equipment used in Technology Education program. Two lecture hours and one 3-hour laboratory per week.

TCED 260 Industrial Safety**2 Credits**

Introduction to the total problems of loss in Industry with emphasis on the problem of accident prevention, Safety Management system, health hazards, safety equipment, accident investigation and control; includes history organization, identification and appraisal of accident-producing conditions and practices. Two lecture hours per week.

TCED 281A Practicum in Technology I (Automotive)**1 Credit**

Two hundred twenty hours of laboratory work experience in welding, tire service shop, auto body and auto mechanics repair workshops. *Prerequisite: AUTO 110, AUTO 224*

TCED 381A Practicum in Technology II (Automotive)**1 Credit**

Two hundred twenty hours of advanced laboratory work experience in auto mechanic and auto body workshops. *Prerequisite: TCED 281A*

TCED 281C Practicum in Technology (Construction)**1 Credit**

One hundred twelve hours of laboratory work experience in wood shop. *Prerequisite: WOOD 181*

TCED 282C Practicum in Technology (Construction)**1 Credit**

One hundred twelve hours of laboratory work experience in building construction. *Prerequisite: TCED 281C and CNST 265.*

TCED 281E Practicum in Technology I (Electronics)**1 Credit**

Two hundred twenty hours of laboratory work experience in basic repair, maintenance and managing of electronics shop. *Prerequisite: ELCT 121*

TCED 381E Practicum in Technology II (Electronics)**1 Credit**

Two hundred twenty hours of laboratory work experience in advanced repair, maintenance and managing of the radio station. *Prerequisite: TCED 281E*

TCED 325 Technology Entrepreneurship 2 Credits

A study on the theory and practice of the technological work environment. Emphasis is placed on aspects of its operation, management and ownership. It also incorporates matters of finances, equipment and facilities, record keeping, government policies and requirements. Two lecture hours per week.

TCED 335 Fleet Management**2 Credits**

A study of fleet management with emphasis on cost control and efficiency improvement.

Emphasis is given to the three dimensions of the efficient operation of the automobile-the driver, the manager, and the vehicle itself. Two lecture hours per week.

TCED 350 Industrial Economy

3 Credits

A study of engineering decision methodology and criteria used to include economic factors in determining the best alternative in the design and selection of equipment structures, methods and processes. Three lecture hours per week. *Prerequisite: MATH 191 or equivalent.*

TCED 390 Independent study

1 Credit

Individual study, research, or project in some field of technology that is not covered in any course taken under the direction of a member of the departmental faculty.

Prerequisite: 15 credits in technology and the instructor's permission. Can be repeated up to 6 credits.

TCED 400 Attachment in Industry (OJT)

4 Credits

This course provides the bridge between the theoretical knowledge gained from learning in the classroom setting and the practical skills required by business organizations and industries beyond those acquired in their usual learning environment. Requires 350 hours of practical work in student's area of specialization. Completion of practicum hours and approval of the supervisor are considered.

TCED 401 Topics in Technology (A,B,C)

(1,2,3) Credits

Topics of current or special interest to faculty and students that are not covered adequately by regular courses are under this title. This course may be repeated for different topics.

Prerequisite: Consent of the Department.

TCED 441 Senior Project I

2 Credits

A project made during the student's senior year representing his/her major area of interest and ability. The course involves title defense and project proposal defense. The work is to be supervised by assigned departmental faculty. The project should reflect the student's level of competence, incorporate a variety of skills and originality. *Prerequisite: Must have 50 credits in major area.*

TCED 442 Senior Project II

2 Credits

Implementation of the approved proposed project in TCED 441. A final defense of the implemented project is required. *Prerequisite: TCED 441.*

TCED 454 Shop Planning and Organization

2 Credits

A study of floor-planning and general design of the auto workshop. Emphasis will be on efficient use of equipment, space, and human resources. Special consideration will be given to safety and government regulations related to shop practices. One lecture hour and one 3-

hour laboratory per week.

TCED 462 Thermodynamics

3 Credits

Scope of classical thermodynamics. The concept of the zeroth law of thermodynamics. Concept of state functions. Work, heat, internal energy and Enthalpy. First law of thermodynamics. Steady-flow energy equation, applications to boilers, condensers and turbines. The concept of heat engine. Entropy. Second law of thermodynamics. Power production: vapour power cycles-Rankine cycle, thermodynamic properties of steam (steam tables and Mollier diagram), steam turbines; performance of steam turbines (temperature-entropy). Application of steam turbines to co-generation. Pressure turbines. Heat transfer: Modes of heat transfer. One dimensional and 2-dimensional steady state conduction. Insulation, Natural and forced convection. Radiation. Heat exchangers:- types and determination. Two lecture hours and one 3-hour laboratory per week.

WOOD TECHNOLOGY

WOOD 181 Bench Woodworking

2 Credits

A study of wood as it pertains to furniture building with a thorough acquaintance with the proper use and maintenance of hand woodworking tools. The laboratory involves building a project using only hand tools with an emphasis on safe shop practices. One lecture hour and one 3- hour laboratory per week.

WOOD 182 Machine Woodworking

3 Credits

Introduction to design and wood identification, and the construction of appropriate projects from working drawings with emphasis on safe and proper use of woodworking machines. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: WOOD 181 or equivalent.*

WOOD 387 Furniture Design and Construction

3 Credits

Furniture, its design, construction and finishing methods. The use of jigs as related to wood-making processes. Projects are chosen in consultation with the instructor. Two lecture hours and one 3-hour laboratory per week. *Prerequisite: WOOD 182.*

WOOD 100 Wood Work

1 credit

The study of indigenous trees found in ecological zone of Kenya. Learning the basic hand tools used in the construction of simple furniture. The laboratory involves building a project using only hand tools with an emphasis on furniture construction. Thirty minutes lecture and one 2-hours laboratory per week.