COURSE CURRICULUM AND ASSESSMENT STANDARDS

SECTION D: INTRODUCTORY LEVEL

The following pages define the curriculum and assessment standards for the introductory level of Electro-Technologies.

Introductory level courses help students build daily living skills and form the basis for further learning. Introductory courses are developed for students who have no previous experience in the strand.

General outcomes define the competencies a student must demonstrate to achieve success in a course. Assessment standards define the criteria and conditions to be used for assessing the competencies defined in the course learner expectations.

Specific outcomes provide a detailed framework for instruction and help students build the competencies defined in the general outcomes. Additional information and suggestions for instruction are provided in the Notes column; teachers may wish to use this space to record their ideas for instruction or student projects.

COURSE ELT1010: ELECTRO-ASSEMBLY 1

Level: Introductory

Theme: Fabrication and Service Principles

Prerequisite: None

Description: Students apply basic fabricating and servicing techniques to construct and test electronic and electromagnetic devices and cables.

Parameters: Basic hand tools, soldering equipment, voltmeter, ohmmeter/test light and related resources.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• apply the appropriate fabrication techniques, including proper soldering and component assembly procedures, to construct and test a simple electronic circuit	• construction of a simple electronic project and observation of: – plan of action – complexity of system/circuit function – quality of assembly – testing procedures. *Assessment Tool* *ELT1010: Assessment Checklist: Laboratory Practice, Part 1* *Standard* *Performance rating of 1 for each applicable task*	45
• apply the appropriate fabrication techniques to construct and test an electromagnetic device	• construction of a simple magnetic device and observation of: – circuit function – complexity of system – system/circuit testing. *Assessment Tool* *ELT1010: Assessment Checklist: Laboratory Practice, Part 2* *Standard* *Performance rating of 1 for each applicable task*	30

COURSE ELT1010: ELECTRO-ASSEMBLY 1 (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• identify and assemble common electrical/ electronic cables and connectors used in power, audio and video connections	• construction of the following: – one soldered connection (RCA patch cord) – one solderless connection (power extension cord) – one communication cable connection (telephone extension cord) – one current cable connection (crimp connected cable). *Assessment Tool* *ELT1010: Assessment Checklist: Laboratory Practice, Part 3* *Standard* *Performance rating of 1 for each applicable task*	20
• demonstrate established laboratory procedures and safe work practices	• observed performance in: – following established laboratory procedures – safe soldering practices – avoiding electrical hazards. *Assessment Tool* *ELTPSP: Assessment Checklist: Laboratory Procedures and Safety Practices* *Standard* *Performance rating of 1 for each applicable task*	5
• demonstrate basic competencies.	• observations of individual effort and interpersonal interaction during the learning process. *Assessment Tool* *Basic Competencies Reference Guide and any assessment tools noted above*	Integrated throughout

Concept	Specific Outcomes	Notes
Safety/Resource Management	*The student should:* • demonstrate safe home/lab procedures with respect to electrical hazards and use of solder and flux • identify and explain the importance of electrical protection devices.	Fuses, breakers.

COURSE ELT1010: ELECTRO-ASSEMBLY 1 (continued)

Concept	Specific Outcomes	Notes
Fundamentals	*The student should:* • construct and analyze a simple control circuit	
	• measure voltage and continuity to appraise condition of circuit using appropriate instrumentation; e.g., simple alarm, simple automobile circuit, multimeter (digital and analog)	Techniques video.
	• define AC/DC voltages and polarity	
	• use proper solder and soldering techniques to gain an understanding of their value	Power cable, communication cable (solder and solderless).
	• install specialty connectors and cables to acquire knowledge and skills	
	• demonstrate an understanding of specialty cables that link systems with special functions including fibre optics, coaxial, telephone	
	• identify components.	Resistor and capacitor identification.
Designing and Prototyping	• analyze several magnetic devices to formulate an understanding of their function; e.g., speakers, electromagnetic crane, tape heads, moving magnetic pick-ups, relays, magnetic strip, levitation trains, magnetic device in hard drive	
	• use various breadboarding techniques to be able to understand methods used; e.g., nail and board sector and spring clip, wire wrap, point to point and solderless breadboard.	

COURSE ELT1030:	**CONVERSION & DISTRIBUTION**
Level:	Introductory
Theme:	Power Systems
Prerequisite:	None
Description:	Students experiment and work with principles of electrical energy conversion and distribution.
Parameters:	Basic hand tools, multimeter and related resources.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• identify and describe methods of converting nonrenewable and renewable sources of energy into electricity	• identification and description of six ways of converting energy into electricity in Alberta. *Assessment Tool* *ELT1030–1: Project Assessment: Electrical Energy Conversion and Distribution* *Standard* *Performance rating of 1 for each applicable task*	5
• construct an electrical distribution system	• construction of an electrical distribution system that includes: – source, load, wiring and control devices – series/parallel and combination circuits. *Assessment Tool* *ELT1030–1: Project Assessment: Electrical Energy Conversion and Distribution* *Standard* *Performance rating of 1 for each applicable task*	40

COURSE ELT1030: CONVERSION & DISTRIBUTION (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• demonstrate how mechanical, chemical, light and heat energy can be converted into electrical energy	• prototyping and operating any two energy conversion systems: – comparing outputs of the two sources – working cooperatively with others. *Assessment Tool* *ELT1030–1: Electrical Energy Conversion and Distribution* *Standard* *Performance rating of 1 for each applicable task*	30
• determine the cost efficiency, practicality and environmental impact of producing electricity from various sources of energy	• presentation of an oral or written report that identifies cost efficiency, practicality and the environmental impact of providing energy from one or more renewable and nonrenewable energy sources. *Assessment Tool* *ELT1030–1: Electrical Energy Conversion and Distribution* *Standard* *Performance rating of 1 for each applicable task*	20
• demonstrate established laboratory procedures and safe work practices	• observed performance related to following: – established laboratory procedures – safe work practices pertaining to high voltages. *Assessment Tool* *ELT1030–1: Electrical Energy Conversion and Distribution* *Standard* *Performance rating of 1 for each applicable task*	5
• demonstrate basic competencies.	• observations of individual effort and interpersonal interaction during the learning process. *Assessment Tool* *Basic Competencies Reference Guide and any assessment tools noted above*	Integrated throughout

COURSE ELT1030: CONVERSION & DISTRIBUTION (continued)

Concept	Specific Outcomes	Notes
Safety	*The student should:* • identify and follow safety procedures in home/laboratory.	Describe hazards of working with high voltages.
Designing and Prototyping	• build and/or operate one energy conversion system that produces electricity using chemical, light, heat and/or mechanical energy forms.	Have students produce electricity using: • lemon • potato • photo/solar cell • crystals • thermocouple • generator.
System Identification	• identify and describe how energy is converted into electricity in a: – wet/dry cell – photovoltaic cell – thermocouple – generator/alternator – piezoelectrical crystal • describe electrical power distribution systems from source to consumer • research issues related to electrical generation, transmission and distribution systems, e.g.: – cost efficiencies – environmental impact of fossil fuel, hydro electric and nuclear power plants – conventional (fossil fuel) versus nonconventional (tidal, solar, wind) sources.	
Real-world Application	• report on issues related to energy efficiency and conservation • identify specific applications of energy conversion used in personal life.	Bicycle generator, solar panel, wind generator, gas generator.
Fabricating/Testing	• wire common lighting and communication circuits: – breadboarding (low voltage) – switches, lights, plugs, bells, buzzers, etc. • test circuits for continuity and function.	*Basic Wiring* (Creative Homeowner Press, 1994). Use a variety of load and control devices.

COURSE ELT1030: CONVERSION & DISTRIBUTION (continued)

Concept	Specific Outcomes	Notes
Careers	*The student should:* • explain employment opportunities in electrical generation and distribution.	Tour substations and/or view videos. *Apprenticeship and Industry Training Act.*

COURSE ELT1050: ELECTRONIC POWER SUPPLY 1

Level: Introductory

Theme: Power Systems

Prerequisite: ELT1010 Electro-assembly 1

Description: Students construct different types of alternating and direct current power supplies, and demonstrate their application in electrical/electronic systems.

Parameters: Basic hand tools, multimeter and related resources; direct teacher supervision for line voltage connections.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• identify and describe various types of alternating and direct current power supplies	• an oral or written report that: – distinguishes between voltage, current and power ratings and between various AC and DC power supplies – describes power supply ratings – describes the configuration of a rectifier. *Assessment Tool* *ELT1050–1: Presentations/Reports: Power Supplies* *Standard* *Performance rating of 1 for each applicable task*	20
• construct a simple power supply	• observed performance when identifying, designing and constructing a power supply for a: – battery tester – battery eliminator – battery charger. *Assessment Tool* *ELTLAB–1: Laboratory Practice, Parts 3 and 4* *Standard* *Performance rating of 1 for each applicable task*	55

COURSE ELT1050: ELECTRONIC POWER SUPPLY 1 (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• test a regulated, filtered power supply for output characteristics	• accurate measurement of power supply characteristics using a multimeter. *Assessment Tool* *ELTLAB–1: Laboratory Practice, Part 4* *Standard* *Performance rating of 1 for each applicable task*	20
• demonstrate established laboratory procedures and safe work practices	• observed performance in following: – established laboratory procedures – grounding precautions – proper handling of high voltage current devices. *Assessment Tool* *ELTPSP: Assessment Checklist: Laboratory Procedures and Safety Practices* *Standard* *Performance rating of 1 for each applicable task*	5
• demonstrate basic competencies.	• observations of individual effort and interpersonal interaction during the learning process. *Assessment Tool* *Basic Competencies Reference Guide and any assessment tools noted above*	Integrated throughout

Concept	Specific Outcomes	Notes
Safety/Resource Management	*The student should:* • demonstrate a positive attitude of personal safety • identify, locate and use proper personal protective equipment.	Demonstrate proper grounding of high voltage and current devices. Use only Canadian Standards Association (CSA) approved equipment.

COURSE ELT1050: ELECTRONIC POWER SUPPLY 1 (continued)

Concept	Specific Outcomes	Notes
System Identification	*The student should:* • distinguish and describe voltage, current and power ratings on a power supply • describe AC and DC power supplies • distinguish between various power supplies, such as transformers, inverters, converters, eliminators, battery, solar, voltage doubler, voltage tripler • identify stages of a power supply in transformer, rectifier, filter and regulator • appraise the merits and deficiencies of half wave, full wave bridge and centre tap rectifiers.	Investigate television, radio, stereo and appliance ratings. Simple, AC/DC power supplies, battery tester, battery eliminator, battery charger.
Fabricating/Testing	• construct simple power supplies, using perforated circuit board • measure power supply output using a multimeter.	Simple, AC/DC power supplies, battery tester, battery eliminator, battery charger. Measuring voltage and current.

COURSE ELT1060: DIGITAL TECHNOLOGY 1

Level: Introductory

Theme: Computer Logic Systems

Prerequisite: ELT1010 Electro-assembly 1

Description: Students construct and demonstrate logic systems and their unique functions.

Parameters: Five-volt power supply, logic probe and related resources.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• describe the binary numbering system and logic gates	• observed performance related to: – identifying and converting binary and base 2, 8 and 16 numbering systems – identifying the symbols for basic logic gates – stating the function of basic logic gates – writing a truth table for a logic gate circuit. *Assessment Tool* *ELT1060–1: Presentations/Reports: Binary Numbering System* *Standard* *Performance rating of 1 for each applicable task*	20
• construct and verify basic logic gates	• observed performance when constructing a binary logic circuit and verifying it with a truth chart using a logic probe. *Assessment Tool* *ELTLAB–3: Assessment Checklist: Laboratory Practice* *Standard* *Performance rating of 1 for each applicable task*	35
• construct a simple logic circuit, and explain its functions	• observed performance using logic gates or hardwired contact to solve a design problem. *Assessment Tool* *ELT1060–1: Presentations/Reports: Binary Numbering System* *Standard* *Performance rating of 1 for each applicable task*	35

COURSE ELT1060: DIGITAL TECHNOLOGY 1 (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will: • identify the major integrated circuit (IC) families, and describe their unique functions	*Assessment of student achievement should be based on:* • identifying and knowing the function of selected integrated circuit (IC) families. *Assessment Tool* *ELT1060–1: Presentations/Reports: Binary Numbering System* *Standard* *Performance rating of 1 for each applicable task*	5
• demonstrate established laboratory procedures and safe work practices	• observed performance in following: – established laboratory procedures – when and how to perform electrostatic discharge. *Assessment Tool* *ELTPSP: Assessment Checklist: Laboratory Procedures and Safety Practices* *Standard* *Performance rating of 1 for each applicable task*	5
• demonstrate basic competencies.	• observations of individual effort and interpersonal interaction during the learning process. *Assessment Tool* *Basic Competencies Reference Guide and any assessment tools noted above*	Integrated throughout

Concept	Specific Outcomes	Notes
Safety/Resource Management	*The student should:* • identify and follow laboratory safety procedures • explain how to avoid electrostatic discharges around IC chips • demonstrate an understanding of grounding, voltage and current rating of various IC families.	Grounding, power supplies.

COURSE ELT1060: DIGITAL TECHNOLOGY 1 (continued)

Concept	Specific Outcomes	Notes
System Identification	*The student should:* • distinguish between analog and digital systems • identify major component sections of a logic system, such as: – random access memory (RAM) – read only memory (ROM) – central processing unit (CPU) – registers – input/output (I/O) ports • identify the application, pinouts and use of various IC chips from manufacturing codes • identify characteristics of various IC chips from different manufacturers which do similar functions using ECG, NTE and other replacement guides • identify the pinouts and function of any IC using the IC master reference texts • identify the difference between various logic families • identify/explain differences between various logic systems • use a digital probe.	TTL, CMOS, DTL , RTL, MOS. Refer to *Semiconductor Reference Handbook*. Note: Many replacement guides are produced for computers in CD ROMs. Digital displays, password strips, combination locks, security controls, counters, digital multimeters.
Fundamentals	• develop the circuits and tables for the following logic gates: – AND – OR – NOT – X-OR – NAND – NOR – XNOR, etc.	
Fabricating/Testing	• construct digital probes • test digital probes.	Logic probe kit or perforated board.

COURSE ELT1060: DIGITAL TECHNOLOGY 1 (continued)

Concept	Specific Outcomes	Notes
Designing and Prototyping	*The student should:* • breadboard a digital system, such as combination locks and keyboard • use emulation software; e.g., electronics workbench.	
Problem Solving	• solve a digital problem and build a digital system for a solution (two or three inputs for a single output).	Two input gates to make a three-input gate.
Careers	• research areas of certification: – trade certification – vendor certification – professional associations – equipment standards.	

COURSE ELT1080: CONTROL SYSTEMS 1

Level: Introductory

Theme: Computer Logic Systems

Prerequisite: ELT1010 Electro-assembly 1

Description: Students construct process control systems, demonstrate their basic operation, and demonstrate procedures for testing them.

Parameters: Digital/analog multimeters, pressure devices and related resources.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• identify how control systems are used in residential and commercial applications	• listing and describing four different control systems used in home and industrial settings. *Assessment Tool* *ELT1080–1: Presentations/Reports: Control Systems* *Standard* *Performance rating of 1 for each applicable task*	15
• identify basic process control systems, and explain how they function	• describing basic process control systems including open and closed-loop systems. *Assessment Tool* *ELT1080–1: Presentations/Reports: Control Systems* *Standard* *Performance rating of 1 on each criteria*	15
• construct basic process control circuits, using passive devices	• observed performance when constructing and testing a system using four passive devices. *Assessment Tool* *ELTLAB–1: Laboratory Practice, Parts 3 and 4* *Standard* *Performance rating of 1 on each criteria*	65

COURSE ELT1080: CONTROL SYSTEMS 1 (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will: • demonstrate established laboratory procedures and safe work practices	*Assessment of student achievement should be based on:* • observed performance in following: – established laboratory procedures – safe and correct procedures in measuring voltage, current and resistance. *Assessment Tool* *ELTPSP: Assessment Checklist: Laboratory Procedures and Safety Practices* *Standard* *Performance rating of 1 for each applicable task*	5
• demonstrate basic competencies.	• observations of individual effort and interpersonal interaction during the learning process. *Assessment Tool* *Basic Competencies Reference Guide and any assessment tools noted above*	Integrated throughout

Concept	Specific Outcomes	Notes
Safety/Resource Management	*The student should:* • demonstrate safe and correct procedures in measuring voltage, current and resistance using digital and analog meters.	
Fundamentals	• draw and explain a process control system using block diagrams depicting each functional component and the flow of signals through the systems • explain the difference between open-loop and closed-loop control systems	Use any control system found in a home or car; e.g., • car thermostat • home thermostat • fuel quantity measurement • coolant temperature measurement.

COURSE ELT1080: CONTROL SYSTEMS 1 (continued)

Concept	Specific Outcomes	Notes
Fundamentals (continued)	*The student should:* • explain process control terms: – precision – standard – calibration – accuracy – sensor – transducers – distortion – transients – sampling – interrupt – frequency	
	• demonstrate knowledge in measuring voltage, current and resistance in any control system using analog and digital instruments.	Use digital/analog multimeters.
Fabricating/Testing	• construct a basic process control system using passive devices, such as: – thermistor – pressure sensor – proximity switch – light control resistor – float switch – reed switch – photo cell.	
	• explain how to test process control circuit(s), voltage, current, continuity, opens, shorts.	Use analog and digital meters.

COURSE ELT1090: ANALOG COMMUNICATION 1

Level: Introductory

Theme: Communication Systems

Prerequisite: ELT1010 Electro-assembly 1

Description: Students install and demonstrate the fundamentals of various consumer audio integrated systems.

Parameters: Consumer audio or automobile systems, multimeters and related resources.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• distinguish the difference between terms and specifications used in analog audio systems	• the ability to distinguish the difference between terms and specifications such as: – wattage – peak value – sine waves – distortion – impedance matching. *Assessment Tool* *ELT1090–1: Presentations/Reports: Analog Audio* *Standard* *Performance rating of 1 for each applicable task*	15
• install a functional audio system according to a given set of specifications	• observance of performance in installing an audio system. *Assessment Tool* *ELTLAB–1: Laboratory Practice, Parts 3 and 4* *Standard* *Performance rating of 1 for each applicable task*	50

COURSE ELT1090: ANALOG COMMUNICATION 1 (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• service and maintain a consumer audio system	• observed performance related to: – identifying problems – cleaning and adjusting components – correcting faults. *Assessment Tool* *ELTLAB–1: Laboratory Practice, Part 5* *Standard* *Performance rating of 1 for each applicable task*	30
• demonstrate established laboratory procedures and safe work practices	• observed performance in following: – established laboratory procedures – procedures regarding high current and heat – correct wiring procedures and use of current protection. *Assessment Tool* *ELTPSP: Assessment Checklist: Laboratory Procedures and Safety Practices* *Standard* *Performance rating of 1 for each applicable task*	5
• demonstrate basic competencies.	• observations of individual effort and interpersonal interaction during the learning process. *Assessment Tool* *Basic Competencies Reference Guide and any assessment tools noted above*	Integrated throughout

Concept	Specific Outcomes	Notes
Safety/Resource Management	*The student should:* • identify causes of high current and high heat in systems • follow correct wiring procedures.	Fusing, load-carrying capacity of cables, temperatures, heat dissipation.

COURSE ELT1090: ANALOG COMMUNICATION 1 (continued)

Concept	Specific Outcomes	Notes
Fundamentals	*The student should:* • read and interpret an audio system flow connection chart. • define audio terms and specifications such as wattage, peak value, sine waves, distortion, impedance matching.	
System Identification	• identify various subsystems of an audio system, including: – amplifier – preamp – equalizer – speakers – compact disc player – tape – crossover. • identify major components of an amplifier through the use of block diagram, identifying power supply, preamp, amplifier.	
System Application	• install a complete audio system.	Expand to power speakers, equalizers, distribution system.
Fabricating/Testing	• construct a simple audio device, such as: – amplifier – crossover network – fader – equalizer – distribution network – mixers – light organ • explain and demonstrate how to test an audio device for intended function.	Consider the possibility of linking this course with ELT2010 Electro-assembly 2.
Problem Solving	• lay out and connect the wiring for an audio system.	Solderless versus solder connections, terminal blocks, fusing, grounding, filtering.

COURSE ELT1090: ANALOG COMMUNICATION 1 (continued)

Concept	Specific Outcomes	Notes
Repair/Service and Maintenance	*The student should:* • explain and demonstrate how to troubleshoot an audio system. • maintain an audio system by identifying problems and correcting.	Clean heads, antenna tuning, poor connections, cleaning volume controls. Check if cost effective.

COURSE ELT1100:	**ELECTRONIC COMMUNICATION**
Level:	Introductory
Theme:	Communication Systems
Prerequisite:	ELT1010 Electro-assembly 1
Description:	Students demonstrate the fundamentals of video systems, and describe their uses.
Parameters:	Special video equipment, cables, connectors and resources.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• describe and compare the operating principles of coaxial cable television (CCTV) and cable television (CATV) video systems	• explanation of the operating principles of the following video systems: – closed circuit television (CCTV) – cable television (CATV). *Assessment Tool* *ELT1100–1: Presentations/Reports: Video Systems* *Standard* *Performance rating of 1 for each applicable task*	25
• describe and compare various video formats	• differentiate between: – VHS – Beta – 8 mm video formats. *Assessment Tool* *ELT1100–1: Presentations/Reports: Video Systems* *Standard* *Performance rating of 1 for each applicable task*	20
• assemble and install connectors associated with video cable network and video electronic systems	• observation of performance when connecting: – camera to recorder – recorder to television – camera/recorder to cable network – computer to cable network – camera or video cassette recorder to computer. *Assessment Tool* *ELTLAB–1: Laboratory Practice, Parts 3 and 4* *Standard* *Performance rating of 1 for each applicable task*	30

COURSE ELT1100: ELECTRONIC COMMUNICATION (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• explain the operation of an analog-modulated video system	• explanation of the operating principles of a given analog-modulated video system. *Assessment Tool* *ELT1100–1: Presentations/Reports: Video Systems* *Standard* *Performance rating of 1 for each applicable task*	20
• demonstrate established laboratory procedures and safe work practices	• observed performance in following: – established laboratory procedures – proper procedures for handling of CRTs – correct procedures when working with static and magnetic sensitive subsystems. *Assessment Tool* *ELTPSP: Assessment Checklist: Laboratory Procedures and Safety Practices* *Standard* *Performance rating of 1 for each applicable task*	5
• demonstrate basic competencies.	• observations of individual effort and interpersonal interaction during the learning process. *Assessment Tool* *Basic Competencies Reference Guide and any assessment tools noted above*	Integrated throughout

Concept	Specific Outcomes	Notes
Safety/Resource Management	*The student should:* • follow laboratory safety procedures, in particular when handling cathode-ray tube (CRT), laser fibre optics, cable connections, vibration-sensitive mounting and static and magnetic sensitive subsystems.	Use of static straps.

Concept	Specific Outcomes	Notes
Fundamentals	*The student should:* • define terms used in video network systems: – video signal – frequency modulation (FM) – video home system (VHS) – Beta – 8 mm – video graphics array (VGA) – closed circuit television (CCTV) – cable television (CATV) – digital modulation – bandwidth – channels – digital pulse modulation – impedance matching.	Explain the difference between RF connectors such as "F," BNC, UHF, TNC.
System Identification	• identify CCTV and CATV video systems • explain the block diagram of the following photo-visual systems: slide, film (8, 16, 32, 70 mm) • differentiate between VHS, Beta, 8 mm, CD video formats.	
System Application	• connect a camera to a recorder • connect a recorder to a TV • connect a camera/recorder to a cable network system • connect a computer to a cable network • connect a video system to minimize video loss (impedance matching) • explain operation of distribution amplifiers. • connect cables according to industry standards.	
Problem Solving	• identify the impedance of different coaxial cables • examine the impedance matching characteristics of different types of cables.	
Ethics	• identify ethical points of view when taking signals from video systems.	

COURSE ELT1110: SECURITY SYSTEMS 1

Level: Introductory

Theme: Communication Systems

Prerequisite: ELT1010 Electro-assembly 1

Description: Students install and demonstrate the fundamentals of sensors, control units and warning devices used in security systems.

Parameters: Specialized equipment.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• identify and compare different electronic systems used to secure people, property and information	• identification and comparison of security systems used to secure: – people – property – information. *Assessment Tool* *ELT1110–1: Presentations/Reports: Security Systems* *Standard* *Performance rating of 1 on each criteria*	5
• describe and compare hardwired sensors	• comparing and describing the following security system sensors: – contact closure – motion sensor – thermal sensor – moisture sensor – light sensor. *Assessment Tool* *ELT1110–1: Presentations/Reports: Security Systems* *Standard* *Performance rating of 1 on each criteria*	35

COURSE ELT1110: SECURITY SYSTEMS 1 (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• install and test a security system, evaluate circuit performance, and identify possible maintenance requirements	• observation of performance when installing a security system • testing and validating circuit performance using voltmeter or continuity tester • explaining and maintaining various security systems. *Assessment Tool* *ELTLAB–1: Laboratory Practice, Parts 3 and 4* *Standard* *Performance rating of 1 on each criteria*	55
• demonstrate established laboratory procedures and safe work practices	• observed performance in following: – established laboratory procedures – personal safety precautions. *Assessment Tool* *ELTPSP: Assessment Checklist: Laboratory Procedures and Safety Practices* *Standard* *Performance rating of 1 on each criteria*	5
• demonstrate basic competencies.	• observations of individual effort and interpersonal interaction during the learning process. *Assessment Tool* *Basic Competencies Reference Guide and any assessment tools noted above*	Integrated throughout

Concept	Specific Outcomes	Notes
Safety/Resource Management	*The student should:* • demonstrate appropriate attitudes of personal safety.	

COURSE ELT1110: SECURITY SYSTEMS 1 (continued)

Concept	Specific Outcomes	Notes
System Identification	*The student should:* • distinguish between different types of security systems; e.g., monitored, standalone, closed circuit, automobile, personal • distinguish between various security devices; e.g., computer systems, hardwire, remote frequency system • demonstrate how to inspect various sensors; e.g., contact closure, motion, thermal, moisture detectors • demonstrate how to inspect various warning devices; e.g., dialer, siren, lights.	
System Application	• explain and demonstrate how to install a security system.	Home or auto security system.
Problem Solving	• demonstrate how to test and validate circuit performance using voltmeter or continuity tester.	
Repair/Service and Maintenance	• explain/maintain various security systems.	Battery testing, performance, reliability, stress testing, sensitivity testing.
Careers	• research careers in the security realm. • research areas of certification of installers and equipment • identify ethical points of view in using personal security systems.	Be aware of possible negative implications.

COURSE ELT1130: ROBOTICS 1

Level: Introductory

Theme: Robotic and Control Systems

Prerequisite: ELT1010 Electro-assembly 1

Description: Students apply the fundamentals of robotic systems and basic robotic functions.

Parameters: No specialized equipment or facilities.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• describe the evolution and applications of robotic systems	• description of trends and evolution of robotic system. *Assessment Tool* *ELT1130–1: Presentations/Reports: Robots* *Standard* *Performance rating of 1 for each applicable task*	15
• identify and classify robotic systems and subsystems	• identifying and classifying robotic systems and subsystems. *Assessment Tool* *ELT1130–1: Presentations/Reports: Robots* *Standard* *Performance rating of 1 for each applicable task*	15
• design and build a direct control robotic system	• observation of performance on designing and building a direct wire robotic system. *Assessment Tool* *ELTLAB–1: Laboratory Practice, Parts 3 and 4* *Standard* *Performance rating of 1 for each applicable task*	65

COURSE ELT1130: ROBOTICS 1 (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will: • demonstrate established laboratory procedures and safe work practices	*Assessment of student achievement should be based on:* • observed performance in following: – established laboratory procedures pertaining to robotics. *Assessment Tool* *ELTPSP: Assessment Checklist: Laboratory Procedures and Safety Practices* *Standard* *Performance rating of 1 for each applicable task*	5
• demonstrate basic competencies.	• observations of individual effort and interpersonal interaction during the learning process. *Assessment Tool* *Basic Competencies Reference Guide and any assessment tools noted above*	Integrated throughout

Concept	Specific Outcomes	Notes
Safety/Resource Management	*The student should:* • follow laboratory safety procedures • adhere to safe equipment practices and personal protection.	
System Identification	• distinguish between various robotic geometric systems. • distinguish between subsystems and their applications.	Power supply, actuators, sensors, program, CPU drivers.
Designing and Prototyping	• prototype a direct control robotic unit to illustrate the: – use of computer-aided design (CAD) – hydraulic, pneumatic and electromechanical interfacing – cumulative serial and parallel operations.	Note: Link with MEC1010: Modes & Mechanisms.

COURSE ELT1130: ROBOTICS 1 (continued)

Concept	Specific Outcomes	Notes
Fundamentals	*The student should:* • demonstrate an understanding of AC/DC motor controls to include switching motor states.	
Problem Solving	• identify problem/task for robotic system • demonstrate operation of a robot through its predetermined set of functions.	Difference between coded and uncoded control.