COURSE ELT3150:	**ROBOTICS 3**
Level:	Advanced
Theme:	Robotic and Control Systems
Prerequisite:	ELT2140 Robotics 2
Description:	Students demonstrate remote/autonomous control systems, by constructing circuits to control robotic behaviour.
Parameters:	CAI robotics package, robotic trainer, surplus electromechanical components (optional) and related resources.
Supporting Courses:	ELT2100 Radio Communication ELT3090 Microprocessor Interface

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 assemble the required components to build a frequency remote control or microprocessor control for a robotic unit	• designing and building a frequency remote or micro-processor control robotic unit to include: – schematic diagrams – pictorial PC board layout diagrams – foil PC board layout diagram – bill of materials – assembly instruction – construction of unit – testing unit operation. *Assessment Tool* *ELTLAB–2: Assessment Checklist: Laboratory Practice, Part 2* *ELTPAF: Project Assessment Form* *Standard* *Performance rating of 3 for each applicable task*	55
• identify various microprocessor control systems and subsystems used in robotic units	• identifying and creating block diagrams of microprocessor control systems and sub-systems and devices that demonstrate various microprocessor control systems and subsystems. *Assessment Tool* *ELTLAB–2: Assessment Checklist: Laboratory Practice, Part 1* *Standard* *Performance rating of 3 for each applicable task*	10

COURSE ELT3150: ROBOTICS 3 (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• explain frequency control or microprocessor control circuits and components in robotic units	• creating block diagrams showing how the frequency or microprocessor control circuits and components function in a robotic unit. *Assessment Tool* *ELTLAB–2: Assessment Checklist: Laboratory Practice, Part 1* *Standard* *Performance rating of 3 for each applicable task*	15
• operate a robotic system that has various feedback controls	• operating and explaining feedback control circuit(s) in a constructed robot. *Assessment Tool* *ELTLAB–1: Laboratory Practice, Part 1* *Standard* *Performance rating of 3 for each applicable task*	10
• demonstrate established laboratory procedures and safe work practices	• observed performance in following: – established laboratory procedures – correct procedures for operation of robots within designed tolerance. *Assessment Tool* *ELTPSP: Assessment Checklist: Laboratory Procedures and Safety Practices* *Standard* *Performance rating of 3 for each applicable task*	5
• create a profile of a trade or occupation within the field of robotics	• completing a career profile chart related to robotics. *Assessment Tool* *ELTCPC: Assessment Guide: Career Profiles* *Standard* *Completing all sections of the profile chart*	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

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Concept	Specific Outcomes	Notes
Safety/Resource Management	*The student should:* • identify and follow safe wiring practices when working with RF • use protection devices for all circuits • operate robotic systems within design tolerances.	RF fusing temperature cutoff.
Fundamentals	• demonstrate the principles of either a remote frequency control or a programming address code control • explain the operation of the electronic components and circuit used to build either a remote control robot or a programmable control robot.	
Systems Identification	• draw and explain the various blocks in either a remote control system or programmable microprocessor/control system • describe and explain use of sight, sound and tactile sensor control systems with either the remote control system or the programmable microprocessor control system • explain the fundamentals of either the remote control system or the programmable microprocessor control system controlling the motor drives in the robotic system • identify the differences between remote control systems and a programmable control system on how the robot gains information about its environment • explain how sensor controls help either the remote control or the programmable control robot to receive feedback from the environment.	Use electronics simulation packages.

COURSE ELT3150: ROBOTICS 3 (continued)

Concept	Specific Outcomes	Notes
Designing and Prototyping	*The student should:* • demonstrate knowledge of either a remote control or a programmable control system by building either a remote control or a microprocessor control for a mobile robot system • prototype either a remote control system or a programmable control system and construct the circuit so that either the remote control or the programmable control controls the motors on the mobile robot • draw the schematic diagram of the printed circuit board and wiring schematic of the control circuitry.	Surplus electro-mechanical components. Robot kit.
Fabrication	• assemble electronic components to build a mobile robot • build either a remote control or a programmable control and mount either control on the mobile robot.	Refer to: *Mobile Robots* (J.L. Jome and A. Flynn), *Robot Builder's Bonanza, 99 Inexpensive Robotic Projects* (Gordon McComb), *Western Canadian Robot Games* (Southern Alberta Institute of Technology).
Real-world Applications	• research the benefits and drawbacks of various remote and/or microprocessor controls that are used to operate a robot • describe where industry is making use of remote and microprocessor control robots.	Tour an industrial plant using robots.
Careers	• research career opportunities in the robotic field.	