

COURSE ELT2140: ROBOTICS 2**Level:** Intermediate**Theme:** Robotic and Control Systems**Prerequisite:** ELT1130 Robotics 1**Description:** Students demonstrate the fundamental concepts of sensor devices and control systems, by building an electronic circuit to control a direct wire or mobile robot.**Parameters:** Multimeter, power supply, soldering stations, hand tools and related resources.**Curriculum and Assessment Standards**

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> design and build a sensor device and control system for the robotic system 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> designing and building a sensory control circuit to operate and control a robotic system. <p><i>Assessment Tool</i> <i>ELTLAB–1: Laboratory Practice, Parts 2 and 3</i></p> <p><i>Standard</i> <i>Performance rating of 2 for each applicable task</i></p>	65
<ul style="list-style-type: none"> identify sensor control systems and subsystems used in robotic systems 	<ul style="list-style-type: none"> identifying sensor control system and subsystem used in the robotic system, such as: <ul style="list-style-type: none"> photoelectric sound tactile proximity thermal. <p><i>Assessment Tool</i> <i>ELT2140–1: Presentations/Reports: Robotic Sensor Controls</i></p> <p><i>Standard</i> <i>Performance rating of 2 for each applicable task</i></p>	10
<ul style="list-style-type: none"> explain sensory control circuits and components used in the robotic control system 	<ul style="list-style-type: none"> explanation of the sensory control circuits and components used to control a drive circuit. <p><i>Assessment Tool</i> <i>ELT2140–1: Presentations/Reports: Robotic Sensors</i></p> <p><i>Standard</i> <i>Performance rating of 2 for each applicable task</i></p>	10

COURSE ELT2140: ROBOTICS 2 (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • operate and demonstrate the capabilities of a robotic system equipped with sensor controls • demonstrate established laboratory procedures and safe work practices • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • operating the various sensor control system and subsystem used in the robotic system. <p><i>Assessment Tool</i> <i>ELTLAB-1: Laboratory Practice, Part 4</i></p> <p><i>Standard</i> <i>Performance rating of 2 for each applicable task</i></p> <ul style="list-style-type: none"> • observed performance in following: <ul style="list-style-type: none"> – established laboratory procedures – safe wiring practices related to sensory control system – use and disposal of chemicals related to circuit board construction – use of solder and fluxes. <p><i>Assessment Tool</i> <i>ELTPSP: Assessment Checklist: Laboratory Procedures and Safety Practices</i></p> <p><i>Standard</i> <i>Performance rating of 2 for each applicable task</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal exploration during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>10</p> <p>5</p> <p>Integrated throughout</p>

Concept	Specific Outcomes	Notes
<p>Safety/Resource Management</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate safe wiring practices when building a sensory control system • use protection devices for all circuits including fusing and temperature cutoff • operate robotic systems within design tolerances. 	

COURSE ELT2140: ROBOTICS 2 (continued)

Concept	Specific Outcomes	Notes
Fundamentals	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate the principles of a photoelectric, sound, tactile, proximity and thermal sensor • explain the operation of the electronic components and circuits used to build sensor controls • explain how sensor control systems are used to control the drive circuit. 	Project constructed and/or available robotic units.
System Identification	<ul style="list-style-type: none"> • draw and explain the various blocks in a sensor control system • describe and explain sight, sound and tactile sensor devices • explain the fundamentals of the control system operating the motor drives in the robotic system • identify the differences among drive systems, sensor control systems and processing systems. 	Project built in Electro-assembly and use with other robotic units.
System Application	<ul style="list-style-type: none"> • research the benefits and drawbacks of various sensory devices that are used to control the robot • describe where industry is making use of sensory control robots. 	Tour an industrial plant using robots.
Designing and Prototyping	<ul style="list-style-type: none"> • demonstrate a knowledge of sensory control systems by building a sensor control for the robot system selecting from the following: <ul style="list-style-type: none"> – photoelectric – sound – tactile – proximity – thermal • prototype a sensory control system and construct the circuit so that the sensor controls the motors on the robot • draw the schematic diagram of the sensor control circuit. 	Robotic kit.

COURSE ELT2140: ROBOTICS 2 (continued)

Concept	Specific Outcomes	Notes
Fabricating/Testing	<i>The student should:</i> <ul style="list-style-type: none">• assemble electronic components to build a sensor• build a sensory control and mount the sensory control on the control robot.	