Robotics I (Dual Credit) 21009A000

Grades 9-12
Year Course – 1.0 Credit
Prerequisite: None

Robotics course develops and expands students' skills and knowledge so that they can design and develop robotic devices. Topics covered in the course may include mechanics, electrical and motor controls, pneumatics, computer basics, and programmable logic controllers. This course will fulfill CTE requirement and will receive college credit at Triton. Course will be taught by Triton Adjunct professor and co-taught with PMSA teacher that has an Engineering background. Student will receive 2 credit hours per semester from Triton. Course will be taught after school from 3:30 to 5:00 twice a week.

Major Curriculum or market served: Engineering Technology

Course Data:

Prefix No.	Course Title	Credit	Lecture	Lab	Clinical Lab	
ENT 205	Robotics I	4.0	3.0	2.0	0.0	

Prerequisite(s): None

Catalog Course Description:

Introductory course to robotics, including applications, assembly, and programming (using LabView for Lego NXT), sensors, motors, drive configurations, software tools, and visual interface.

I. **Overall Learning Goals (1 or 2 sentences):**

Upon successful completion of this course the students will be able to identify a variety of robot applications, types, and configurations, build a robot chassis and program the drive functions for the robot using LabView software from conceptual sketches and action list to safely building the final product.

II. **Resources utilized:**
(In any standard citation format (APA, MLA, Chicago, etc. Refer to the Curriculum Handbook for examples.)

A. Required textbook(s)/workbook(s)

Gasperi, M. (2009). *LabView for Lego Mindstorms NXT – University Edition (including a student license for LabView 8.5)*. Allendale, NJ: NTS Press.

B. Supplementary texts/and materials:

C. Other resources utilized:
YouTube, Robotic Engineering websites

III. **Instructional Strategies:** Check and comment as needed on the instructional methods utilized to attain the course objectives. **(HINT: To check a box, double-click on it and mark "checked")**

☒ Lecture	☒ Discussion	☐ Podcasting
☒ Lecture/Demonstration	☒ Laboratory	☐ Social media
☐ Clinical lab	☒ Independent study	☒ Internet resources
☐ Internship	☐ Power Point	☐ Problem solving/case situations

Other: *Robots built as exercises for individual and group projects. Student journals maintain records of activity. Student-built robots will compete in fun mini-games.*

Comment on instructional methods utilized (optional):

IV. **Formative Assessment:** ***Check the evaluation methods utilized to monitor progress toward attainment of course objectives.***

☒ Quizzes	☒ Laboratory skills	☒ Presentations
☒ Examinations	☒ Oral participation	☒ Projects
☒ Journal	☒ Written assignments	☐ Portfolio
☐ On-line discussion forums	☐ Clinical progress reports	
☐ Pre-/post-test/paper	☐ Coop experience Progress report	

Other:

V. **Summative Assessment:** Check the evaluation method utilized to determine whether final course objectives have been attained.

☐ Final (written) examination	☐ Final coop experience evaluation	☒ Course projects
☐ Final (oral) examination	☐ License/certification exam results	☒ Term papers
☐ Final clinical/laboratory exam	☐ Mid-term examination	☐ Portfolio
☒ Final skills test	☒ Common writing assessment	

Other:

VI. **Indirect Assessment:** Check the assessment method(s) utilized to determine if the learning goals and objectives have been attained.

☐ One-minute paper	☐ Journal assignment/blog
☒ Student survey	☐ Employer survey

Other:

VI. Course Plan: Indicate the distribution of contact hours by topic.

- **Lecture hours should not exceed 6 hours per topic**
- **Lab hours should not exceed 8 hours per topic**
- **Final exam time is above and beyond the course contact hours and should not be included as a topic**

TOPICAL OUTLINE

Topic	Contact Hours		Clinical
	Lecture	Laboratory	Clinical/ Laboratory
Introduction to Robotics, definition, applications, design examples	2	0	
Hardware components	4	4	
LabView software and controls	5	5	
Motors, servos, motor components, Pulse Width Modulated (PWM) signals	4	2	
Software fundamentals, programming languages, data types, variables, logic, flow control	4	3	
Software tools, compiler, shell, debugger	4	2	
Sensors (such as touch, encoder, light, color, ultrasonic, and infrared)	4	2	
Intelligent robot applications, navigation, decision-making	4	2	
Graphical interface	4	2	
Design projects including robot chassis, line follower, pick and place, retrieval, projects and presentations, and design journals	5	5	
TOTAL	**45**	**30**	

Other:

VIII. **Learning Objectives:** For courses approved by ICCB, it is presumed students will spend additional study time in order to meet the following objectives:

- a minimum of 2 hours outside study for each 1 hour of lecture in class
- a minimum of 1 hour of outside study for each 2 hours of lab or clinical in class
- every topic *must* have an objective
- learning objectives must be stated in *demonstrable* and *measurable* terms
- (see Curriculum Handbook for examples)
- indicate 'Lecture' and/or 'Lab' by inserting an 'X' in the appropriate column(s).
- Attach additional pages as needed.

Objective	Lecture	Laboratory	Clinical Clinical/ Laboratory
Define what a robot is and list design examples of robotic applications in everyday life	X		
Identify and describe the hardware components of a robot	X	X	
Describe what LabView software is and what functions it controls	X	X	
Describe and identify data types, variables, flow control, and logic as it relates to software programming languages	X	X	
Perform simple robot patterns using LabView software		X	
Design and build a robot chassis		X	
Explain and identify the significance of navigation and decision making in intelligent applications for robots	X	X	
Program several different functions for the built robot utilizing different sensors such as touch, encoder, light, color, ultrasonic, and infrared		X	
Communicate with clarity and precision written and oral presentations of a design project	X	X	
Design, build, and program an NXT robot to perform a particular set of tasks such as line follower, pick and place, and retrieval	X	X	
Develop and describe a graphical interface for a robot	X	X	
Design and explain a program for a simple robot	X	X	
Identify the different types of sensors used to operate a robot	X	X	
Utilize software tools to compile, shell, and debug a robot program	X	X	
Create a design and programming journal for each project		X	

IX. **General Education Outcomes:** Upon completion of his or her course of education at Triton College, the student will be able to:

☐ Demonstrate critical thinking ☒ Learn information literacy ☐ Practice analytical inquiry
☒ Demonstrate communication fluency ☒ Acquire/apply knowledge specific to field of study
☒ Practice technological fluency ☐ Engage diverse perspectives and civic issues
☐ Encounter sustainable practices ☐ Practice quantitative reasoning
Other: