Career and Technical Education
CTE Course Blueprint

Technology Education

Robotics Engineering I

Concord, North Carolina

Winter 2012
Fall 2015

CTE Course Blueprint

For additional information about this blueprint, contact the Division of Career and Technical Education, North Carolina Department of Public Instruction, 6361 Mail Service Center, Raleigh, North Carolina 27699-6361.

Reference: Anderson, Lorin W. (Ed.), Krathwohl, David R. (Ed.), et al., *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives,* Addison Wesley Longman, Inc., New York, 2001.

Interpretation of Columns on the NCDPI Adapted CTE Course Blueprint

No.	1	2	3	4
Heading	Essential Std #	Unit Titles, Essential Standards, and Indicators	Course Weight	RBT Designation
Column information	Unique course identifier and essential standard number.	Statements of unit titles, essential standards per unit, and specific indicators per essential standard. If applicable, includes % for each indicator.	Shows the relative importance of each unit and essential standard. Course weight is used to help determine the percentage of total class time to be spent on each essential standard.	Classification of outcome behavior in essential standards and indicators in Dimensions according to the Revised Bloom's Taxonomy. **Cognitive Process Dimension:** 1 Remember 2 Understand 3 Apply 4 Analyze 5 Evaluate 6 Create **Knowledge Dimension:** A Factual Knowledge B Conceptual Knowledge C Procedural Knowledge

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Career and Technical Student Organizations (CTSO) are an integral part of this curriculum. CTSOs are strategies used to teach course content, develop leadership, citizenship, responsibility, and proficiencies related to workplace needs.

Adapted CTE Course Blueprint for Robotics Engineering I

(Recommended hours of instruction: 135 or 180 minimum)

Essential Std #	Units, Essential Standards, and Indicators (The Learner will be able to:)	Course Weight	RBT Designation
1	2	3	4
	Total Course Weight	**100%**	
A	**ENGINEERING DESIGN AND CLASSROOM SAFETY**	**13%**	
X101.00	**Analyze and Evaluate Engineering Design Cycle**	**7%**	**B4**
X101.01	Explain the importance of the engineering design cycle (3%)		
X101.02	Demonstrate how to set up an engineering notebook (4%)		
X102.00	**Analyze Classroom Safety Procedures**	**6%**	**C3**
X102.01	Explain the guidelines for safety in the classroom (3%)		
X102.03	Summarize Personal Safety and Classroom Safety procedures (3%)		
B	**COMPUTER PROGRAMMING**	**21%**	
X103.00	**Analyze and apply the concepts of block style programming language**	**9%**	**C3**
X103.01	Explain the steps in writing a computer program (2%)		
X103.02	Discuss the different type of programming components (2%)		
X103.03	Demonstrate writing, compiling and downloading program (5%)		
X104.00	**Create a Computer Programming using C-Based Language**	**12%**	**C6**
X104.01	Demonstrate use of loops, statements, variables, and constants (6%)		
X104.02	Demonstrate how to write program using advanced functions (6%)		
X105.00	**Use laboratory equipment to demonstrate different modes of robotic control**		
X105.01	Operator Control		
X105.02	Autonomous Control		
C	**ENGINEERING PHYSICS**	**23%**	
X106.00	**Analyze and apply concepts of motors to robotic systems**	**4%**	**C3**
X106.01	Discuss the different type of motors and how they are used (2%)		
X106.02	Explain the importance of angular velocity (2%)		
X107.00	**Analyze and apply concepts of gears and gear trains to robotic systems**	**4%**	**C3**
X107.01	Discuss the different types of gears (1%)		
X107.02	Explain the importance of a gear train (1%)		
X107.03	Use laboratory equipment to demonstrate the relationship between mechanical advantage and gear ratios (2%)		
X108.00	**Analyze and apply concepts of linear motion to robotic systems**	**4%**	**C3**
X108.01	Explain linear motion, linear velocity and linear acceleration (1%)		
X108.02	Discuss rotational dynamics (1%)		
X108.03	Discuss Linear and Angular Velocity (1%)		
X108.04	Explain Newton's Laws of Motion (1%)		
X109.00	**Analyze and apply concepts of friction to robotic systems**	**4%**	**C3**
X109.01	Evaluate the effects of friction (2%)		
X109.01	Differentiate static, kinetic and rolling friction (2%)		
X110.00	**Analyze and apply concepts of torque to robotic systems**	**4%**	**C3**
X110.01	Explain the fundamentals of torque (2%)		
X110.02	Explain the relationship between torque and gear ratios (2%)		
X111.00	**Use laboratory equipment to construct robot to pull weighted sled**	**3%**	**C3**
D	**ELECTRICAL AND ELECTRONIC SYSTEMS**	**17%**	
X112.00	**Analyze and apply concepts of sensors to an electrical/electronic systems**	**17%**	**C3**
X112.01	Evaluate the benefits of an Open-Loop vs. Closed-Loop System	**6%**	
X112.02	Analyze and evaluate input from different type of sensors		

Essential Std #	Units, Essential Standards, and Indicators (The Learner will be able to:)	Course Weight	RBT Designation
1	2	3	4
X112.03	Use laboratory equipment and sensors to demonstrate autonomous control of robot	**5%**	
E	**MECHANICIAL SYSTEMS**	**13%**	
X113.00	**Analyze and apply the concepts of physics to mechanical arm**	**13%**	**C3**
X113.01	Evaluate the effects of degrees of freedom in 2 and 3 dimensions	**4%**	
X113.02	Evaluate the effects of mass, weight, center of weight and torque	**3%**	
X113.03	Evaluate the relationship between torque, gear ratio and weight	**3%**	
X113.04	Use laboratory equipment to demonstrate control of mechanical systems	**3%**	
F	**CAPSTONE PROJECT**	**13%**	
X114.00	**Create a robot to meet criteria of Engineering Design Brief**	**13%**	**C6**
X114.01	Create radio controlled robot that meets criteria of engineering design brief and performs the identified tasks (6%)		
X114.02	Create robot that operates autonomously, that meets criteria of engineering design brief and performs the identified tasks (7%)		