

Concrete High School
 COURSE TITLE: Robotics Foundations
 Instructor: Mike Criner

Technology Education Framework
 CIP CODE: 150406

Standard abbreviations:

- IT = ITEA Technological Literacy
- E = STEM Frameworks Standard
- WF =SCANS Workforce Standard
- SV = Skagit Valley College Articulation Competencies
- DW-ICT = Designed World-Information and Communications Technologies

EALR's

- M = Math EALR
- S = Science EARL
- W = Writing EALR
- R = Reading EALR

UNIT 1: INDUSTRIAL SAFETY					
STANDARD		EALR		ACTIVITY	ASSESSMENT
E WF	Manufacturing Technology Standard DW-MT 4: Obtain basic skills in use of Manufacturing equipment and tools Basic Skills: Individual Responsibility. Technology: Students can select equipment and tools.			Safety: Lecture, demonstration	Test, Teacher Observation
	UNIT 2: INTRODUCTION TO DESIGN				
WF	Thinking Skills: Ability to learn, to think creatively, to make decisions, and to solve problems.				

E	<p>Engineering Design 1: Standard A: Introduction to Design Process: Identify and apply group brainstorming techniques and rules associated with brainstorming. Identify the design process steps used in given scenarios and be able to list the steps if missing.</p>			Design and Problem Solving	Student project will satisfy a rubric demonstrating mastery of the Design Loop.
WF	<p>Information: They can acquire, evaluate data, organize and maintain files, interpret and communicate , and use computers to process information.</p>				
E	<p>Engineering Design 1: Standard A: Introduction to Design Process: Apply engineering notebook standards and protocols when documenting work.</p>			Students will maintain a portfolio that contains all their work including CAD projects and word processed reports.	Teacher will inspect the portfolio periodically to insure neatness, completeness, and organization.
E	<p>Engineering Design 1: Standard B: Introduction to Technical Sketching</p>			Lecture, student practice	Teacher will assess student sketches for standards..
E	<p>Engineering Design 1: Standard 12: Fundamental Computer Skills. CS12.01. Demonstrate proper care of equipment. CS 12.05. Start and shut down work station. CS12.06. Adjust monitor controls for maximum comfort and usability.</p>				

E	<p>Cadd Drafting: Standard 14: Basic CADD Skills - Create: CS14.01 Create a new Drawing CS14.02 Perform Drawing Setup CS14.03 Construct geometric figures CS14.04 Create text using appropriate style and size to annotate drawings CS14.05 Use and control accuracy enhancement CS 14.06 Create 2D models CS14.07 Create objects using primitives CS14.08 Revolve a profile to create a 3D model.</p>	R M	<p>R1. Student understands and uses different skills and strategies to read. R2. Student understands the meaning of what is read. R3.1. Students reads to learn new information. R3.2 Student reads to perform a task. M1: The student understands and applies the concepts and procedures of mathematics.</p>	AutoCad Rhino 3D	Students will create drawings using basic tools to create and annotate in both 2D and 3D. The work will use primitives, extrusions and revolutions.
WF	<p>Information: They can acquire, evaluate data, organize and maintain files, interpret and communicate , and use computers to process information.</p>	W	<p>W1: Student writes clearly and effectively. W2: Student writes in a variety of forms for different audiences and purposes. W3: The student understands and uses the steps of the writing process.</p>	Written summary of Design Unit.	Teacher will assess written reports for understanding of the standards.
	<p>UNIT 3: ELECTRONICS</p>				

E	<p>Digital Electronics: Unit 1: Fundamentals Standard B: Basic Electron Theory. Standard C: Scientific prefixes, Standard D: Resistance. Standard E: Ohm's Law. Standard F: Capacitance Standard G: Analog and Digital Waveforms. Standard H: Obtaining Data Sheets. Unit 3: Gates Standard A: Logic Gates Unit 4: Boolean Algebra Standard A: Boolean Expressions. Standard B: Logic Simplifications, Standard C: Duality of Logic Functions.</p>	R M	<p>R1. Student understands and uses different skills and strategies to read. R2. Student understands the meaning of what is read. R3.1. Students reads to learn new information. R3.2 Student reads to perform a task. M1. The student understands and applies concepts and procedures of mathematics. M2. The student uses mathematics to define and solve a problem. M5. The student understands how mathematical ideas connect within mathematics, to other subject areas, and to real life situations.</p>		
WR	<p>Systems- The students understand social, organizational, and technological system. Technology- The student can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.</p>	S	<p>S3.2: Student will understand that science and technology are human endeavors, interrelated to each other, to society and to the workplace.</p>	Basic Electronics Lecture, demonstration, student practice.	Tests, Student demonstration of skills.
	UNIT 4: ROBOTICS				
	Section 4-1: Introduction to Programming				

	DW- ICT 1. Develop an understanding of the Designed World to select and use information and communications technologies.			CNC, Rapid Prototyping, Demonstration, Student practice	Teacher will evaluate student project for quality.
	Section 4-2: Introduction to Robotics.				
SV	8. Designing servo-motor feedback control systems.	M	<p>M1. The student understands and applies concepts and procedures of mathematics.</p> <p>M2. The student uses mathematics to define and solve a problem.</p> <p>M5. The student understands how mathematical ideas connect within mathematics, to other subject areas, and to real life situations.</p>	NXT-Mindstorm. Students will program the robot to move specified distances, times, and revolutions.	Quizzes. Student will demonstrate skills and show calculation documentation.
	Section 4-3: Introduction to Sensors.				
SV	4. Use Ultrasonic and visual systems in collision avoidance applications.		<p>S: Unifying Concepts and Principles: Form and Function</p> <p>Science and Technology: Abilities of Technological Design.</p> <p>Physical Sciences: Motion and Forces.</p> <p>M: Connections: Recognize and apply mathematics concepts in contexts outside mathematics.</p> <p>Numbers and Operations: Understand numbers, ways of representing numbers, relationships among numbers, number systems.</p> <p>Algebra Standard: Understand patterns, relations, and functions.</p>	NXT Mindstorm Sensor projects: Students will program a robot to react to sound, light, ultrasonic, and touch sensors.	Quizzes. Student will demonstrate skills and show calculation documentation.

	Section 4-4: Designing and Building Robots to Perform a Task.				
IT	<p>3.2. Core concepts of technology.</p> <p>3.3: Relationships Among Technologies</p> <p>4.5: Effects of Technology on the Environment.</p> <p>4.7: The influence of Technology on History.</p> <p>5.8: Attributes of Design.</p> <p>5.9: Engineering Design.</p> <p>6.12: Use and maintain Technological Products and Systems.</p>	<p>S</p> <p>M</p>	<p>S: Unifying Concepts and Principles: Form and Function</p> <p>Science and Technology: Abilities of Technological Design.</p> <p>Physical Sciences: Motion and Forces.</p> <p>M: Connections: Recognize and apply mathematics concepts in contexts outside mathematics.</p> <p>Numbers and Operations: Understand numbers, ways of representing numbers, relationships among numbers, number systems.</p> <p>Algebra Standard: Understand patterns, relations, and functions.</p>	Introduction to Vex Robots	<p>Quizzes.</p> <p>Student will demonstrate skills and show calculation documentation.</p>

IT	<p>5.8: Attributes of Design 5.9: Engineering Design. 6.12: Use and maintain Technological Products and Systems.</p>	<p>S M</p>	<p>S: Unifying Concepts and Processes: Form and Function. Physical Science: Motions and Forces. Science and Technology: Abilities of Technological Design. M: Numbers and Operations: Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Algebra Standard: Understand patterns, relations and functions. Geometry Standard: Use visualization, spatial reasoning, and geometric modeling to solve problems. Measurement Standard: Understand measurable attributes of objects and units, systems, and processes of measurement.</p>	<p>Introduction to Autodesk Inventor.</p>	<p>Quizzes. Student will demonstrate skills and show calculation documentation.</p>
IT	<p>3.2: Core Concepts of Technology 5.8: Attributes of Design. 5.9: Engineering Design. 6.12: Use and maintain Technological Products and Systems.</p>	<p>S M</p>	<p>S: Unifying Concepts and Processes: Form and Function. Physical Science: Motions and Forces. Science and Technology: Abilities of Technological Design. M: Numbers and Operations:</p>		

E	<p>Engineering Design 1: Standard 12: Fundamental Computer Skills. CS12.01. Demonstrate proper care of equipment. CS 12.05. Start and shut down work station. CS12.06. Adjust monitor controls for maximum comfort and usability.</p>	<p>Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Communications: Organize and consolidate mathematical thinking through communications. Communicate mathematical thinking coherently and clearly to peers, teachers and others.</p>	Build a Vex Protobot	Teacher will evaluate student project for quality.
IT	<p>5.8: Attributes of Design 6.12: Use and maintain Technological Products and Systems.</p>	<p>S: Unifying Concepts and Processes: Form and Function. Physical Science: Motions and Forces. Science and Technology: Abilities of Technological Design. M: Connections: Recognize and apply mathematics in contexts outside of mathematics.</p>	Microcontrollers and Transmitters	Teacher will evaluate student project for quality.

IT	<p>5.8: Attributes of Design 5.9: Engineering Design 6.12: Use and maintain Technological Products and Systems.</p>	<p>S: Unifying Concepts and Processes: Form and Function. Physical Science: Motions and Forces. Science and Technology: Abilities of Technological Design. M: Numbers and Operations: Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Algebra Standard: Understand patterns, relations and functions. Geometry Standard: Use visualization, spatial reasoning, and geometric modeling to solve problems. Measurement Standard: Understand measurable attributes of objects and units, systems, and processes of measurement.</p> <p>S M</p>	Speed, Power and Torque	Teacher will evaluate student project for quality.
----	---	---	-------------------------	--

IT	<p>5.8: Attributes of Design 5.9: Engineering Design 6.12: Use and maintain Technological Products and Systems.</p>	<p>S: Unifying Concepts and Processes: Form and Function. Physical Science: Motions and Forces. Science and Technology: Abilities of Technological Design. M: Numbers and Operations: Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Algebra Standard: Analyze change in various contexts. Understand patterns, relations, and functions. Geometry Standard: Use visualization, spatial reasoning, and geometric modeling to solve problems. Measurement Standard: Understand measurable attributes of objects and units, systems, and processes of measurement.</p>	Gears, Chains, and Sprockets	Teacher will evaluate student project for quality.
----	--	--	------------------------------	--

IT	<p>5.8: Attributes of Design 5.9: Engineering Design 6.12: Use and maintain Technological Products and Systems.</p>	<p>S: Unifying Concepts and Processes: Form and Function. Physical Science: Motions and Forces. Science and Technology: Abilities of Technological Design. M: Numbers and Operations: Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Algebra Standard: Analyze change in various contexts. Understand patterns, relations, and functions. Geometry Standard: Use visualization, spatial reasoning, and geometric modeling to solve problems. Measurement Standard: Understand measurable attributes of objects and units, systems, and processes of measurement.</p>	Friction and Traction	Teacher will evaluate student project for quality.
----	---	--	-----------------------	--