Curriculum Map:

Crawford Central School District

Science Department

Interactive Technologies I

Course Description: This semester course is specifically designed to give all levels of students' exposure and experience to explore the principles of the engineering process. Entirely project based, students will spend their time using block coding, robots, and web-based apps to solve various engineering challenges.

Unit Title: The Engineering Process

Time frame: 10 Days

Standards: ISTE

1 A, C, D
2 B, C
3 A, B, C, D
4 A, B, C, D
5 A, B, C
6 A, B, C, D
7 A, B, C, D

Big Idea: In answering the question, "How can we make it better?":

1. Engineering Design is a series of steps to solve a problem and design a solution for that problem

Essential Questions:

1. How do we identify a problem?
2. What are the steps of the engineering process?
3. How can a solution for a problem be developed?
4. What do scientists and engineers do to find out more about our world and how it functions?
5. What kinds of questions do scientists and engineers ask?
6. How do scientists and engineers develop and use models?
4. How do scientists and engineers communicate to others to advance science and engineering?

Resources for Unit of Study: Online free resources; Basic construction materials such as Lego or Connect sets; Materials found around the classroom and home

Competency	Vocabulary	Strategy	Assessment
● ISTE 1 Students use technology to be active in choosing and achieving learning goals.	process system engineering	● Problem solving given a limited amount of resources	Daily Log Project rubrics/checklists Project testing results and evaluations/reflections

● ISTE 3 Students evaluate and use appropriate resources to achieve learning opportunities. ● ISTE 4 Students use a variety of technologies within a design process to develop solutions to problems. ● ISTE 5 Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. ● Assess the processes that make a mechanism function successfully ● Make observations on their own work to predict outcome after change ● Apply concepts studied for their own project ● Construct a mechanism to solve a problem ● Critique the strategies of fellow students to offer positive feedback	collaboration technology strategies model evaluate critique	● Research best/past practice relating to the success of a project ● Self and peer evaluations	

Unit Title: Computing Basic Concepts, Theory and Technological Devices

Time frame: 10 Days

Standards: ISTE
3 A, B, C, D
4 A, B
5 A, B, C, D
6 C

Big Idea: In answering the question, "How can we make it better?":

1. Understand that computers and modern technology works by using very simple operations

Essential Questions:
1. What are the basic operations that used to develop computer programs and all modern technological devices?
2. How do programmers use coding logic and decision making to create a program to solve a task?
3. What are the basic components used by most modern technological devices?
4. How do programmers convey their thought processes in solving a problem?

Resources for Unit of Study: Online free resources; Examples of technological devices that can be disassembled and inspected; Materials found around the classroom and home

Competency	Vocabulary	Strategy	Assessment
● ISTE 3 Students evaluate and use appropriate resources to achieve learning opportunities. ● ISTE 4 Students use a variety of technologies within a design process to develop solutions to problems. ● Comprehend and use basic coding instructions to achieve tasks ● Identify basic components of	coding operations logic iteration hardware software programming	● Problem solving given a limited amount of resources ● Research best/past practice relating to the success of a project	Daily Log Project rubrics/checklists Self and peer evaluation / critique.

modern technological devices ● Assess the processes of coding logic and iteration to solve a task			

Unit Title: Computer Screen Tasks (block coding introduction)

Time frame: 20 Days

Standards: ISTE

1 A, C
3 A
5 A, B, C, D
6 B, C

Big Idea: In answering the question, "How can we make it better?":

1. Understand that logic (decision making) and iteration are key concepts in computer coding and that block coding is a simplified method to develop computer programs.

Essential Questions:
1. How can block coding and fundamental concepts of coding be used to develop computer programs?
2. How can block coding logic and decision making solve a task?
3. How can sprites be created and manipulated using code?
4. How do programmers convey their thought processes in solving a problem?
5. How do coders test, debug and evaluate programs?

Resources for Unit of Study: Online free resources, free software, robots and handheld devices

Competency	Vocabulary	Strategy	Assessment
● ISTE 1 Students use technology to be active in choosing and achieving learning goals. ● ISTE 2 Students recognise the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in	block coding sprites debug objects functions program	● Apply basic input using block coding ● Observe and apply changes to a code to change the action of a sprite ● Problem solving given a limited	Daily Log Project rubrics/checklists Project testing results and evaluations/reflections

ways that are safe, legal and ethical. ● ISTE 3 Students evaluate and use appropriate resources to achieve learning opportunities. ● ISTE 4 Students use a variety of technologies within a design process to develop solutions to problems. ● ISTE 5 Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. ● ISTE 6 Students communicate clearly and express themselves creatively for a variety of purposes using the the platforms, tools, styles, formats and digital media appropriate to their goals. ● Manipulate sprite objects using functions within block coding ● Predict resulting actions based on input using block coding ● Make observations on their own work to predict a new outcome after implementing a change ● Construct a program with block coding that solves a problem or that has evolved using the engineering process		amount of resources ● Research best/past practice relating to the success of a project	

Unit Title: Coding for Drones

Time frame: 15 Days

Standards: ISTE

1 A, C, D
2 B
3 B, D
4 A, B, C, D
5 A, B, C
6 A, B, D
7 B, C

Big Idea: In answering the question, "How can we make it better?":

1. Understand how to use block coding to control simple robots with standard coding logic to solve given tasks

Essential Questions:
1. How does coding control and direct robots to achieve a desired task?
2. What are strengths and limitations of using programmed robots?
3. How do changes in coding affect the actions of a robot?

Resources for Unit of Study: Online free resources, free software, robots and handheld devices

Competency	Vocabulary	Strategy	Assessment
● ISTE 1 Students use technology to be active in choosing and achieving learning goals. ● ISTE 2 Students recognise the rights, responsibilities and opportunities of living, learning and working in an interconnected digital	drone controls feedback	● Apply coding strategy to moving robots ● Develop a means to an end using coding and strategic thinking	Daily Log Project rubrics/checklists Project testing results and evaluations/reflections

world, and they act and model in ways that are safe, legal and ethical. ● ISTE 3 Students evaluate and use appropriate resources to achieve learning opportunities. ● ISTE 4 Students use a variety of technologies within a design process to develop solutions to problems. ● ISTE 5 Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. ● ISTE 6 Students communicate clearly and express themselves creatively for a variety of purposes using the the platforms, tools, styles, formats and digital media appropriate to their goals. ● Examine the workings of drones in the classroom ● Apply the engineering and block coding processes to programing drones ● Make observations on their own work to predict outcome after change ● Solve maze type problems with tangible outputs from drones ● Analyze peer solutions to mazes ● Draw conclusions based on		● Design code that navigates a drone through an obstacle course	

exemplar codes			

Unit Title: App Creation

Time frame: 15 Days

Standards: ISTE

1 A, C, D
2 B, C
3 A, B, C, D
4 A, B, C, D
5 A, B, C, D
6 A, B, C, D
7 A, B, C, D

Big Idea: In answering the question, "How can we make it better?":

1. Understand how to use block coding and the sensors from a handheld device to create apps for handheld devices to solve given tasks.

Essential Questions:
1. How can coding be used on handheld devices to achieve a desired task?
2. How can the coding for an app on a handheld device utilize the sensors on these devices?
3. How does changes in coding affect the actions of a app on a handheld device?
4. What are tasks that can be done on a handheld device that can not be done on a desktop computer?

Resources for Unit of Study: Online free resources, free software, robots and handheld devices

Competency	Vocabulary	Strategy	Assessment
● ISTE 1 Students use technology to be active in choosing and achieving learning goals. ● ISTE 2 Students recognise the rights, responsibilities and opportunities of living, learning and	app interface sensor design develope	● Analyze app creation programs and create an app ● Work to enhance an existing app	Daily Log Project rubrics/checklists Project testing results and evaluations/reflections

working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical. ● ISTE 3 Students evaluate and use appropriate resources to achieve learning opportunities. ● ISTE 4 Students use a variety of technologies within a design process to develop solutions to problems. ● ISTE 5 Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. ● ISTE 6 Students communicate clearly and express themselves creatively for a variety of purposes using the the platforms, tools, styles, formats and digital media appropriate to their goals. ● Compare/Contrast app inventor programs for varying platforms ● Formulate a plan for an app design using block coding ● Connect the engineering process to design and develop an app ● Analyze and critique peer projects			

Unit Title: Culminating Project

Time frame: 20 Days

Standards: ISTE

1 A, C, D
2 A, B, C
3 A, B, C, D
4 A, B, C, D
5 A, B, C, D
6 A, B, C, D
7 A, B, C, D

Big Idea: In answering the question, "How can we make it better?":

1. Use engineering design steps to solve a problem and design a personal solution for that problem.

Essential Questions:

1. What kinds of questions or problems can coders determine need a technological device?
2. What are the steps of the engineering process?
3. How can a solution for a problem be developed?
1. What is the appropriate technological solution for a given task?
4. How do coders communicate to others to improve projects?

Resources for Unit of Study: Online free resources, free software, robots and handheld devices

Competency	Vocabulary	Strategy	Assessment
● ISTE 1 Students use technology to be active in choosing and achieving learning goals. ● ISTE 2 Students recognise the rights, responsibilities and	Content area vocabulary listed in the PA Core Standards	● Problem solving given a limited amount of resources ● Research best/past practice relating to	Daily Log Project rubrics/checklists Project testing results and evaluations/reflections

opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical. ● ISTE 3 Students evaluate and use appropriate resources to achieve learning opportunities. ● ISTE 4 Students use a variety of technologies within a design process to develop solutions to problems. ● ISTE 5 Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. ● ISTE 6 Students communicate clearly and express themselves creatively for a variety of purposes using the the platforms, tools, styles, formats and digital media appropriate to their goals. ● Explain phenomena in terms of concepts ● Assess the processes that make a mechanism function successfully ● Make observations on their own work to predict outcome after change ● Apply concepts studied for their own project ● Construct a mechanism to solve a		the success of a project	

problem ● Critique the strategies of fellow students to offer positive feedback			