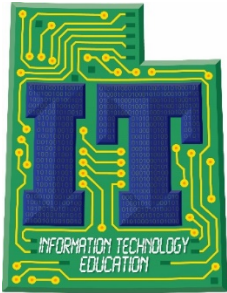


# STRANDS AND STANDARDS

## EXPLORING COMPUTER SCIENCE 2



### Course Description

Exploring Computer Science 2 is designed to introduce students to the breadth of the field of computer science through an exploration of engaging and accessible topics. Rather than focusing the entire course on learning particular software tools or programming languages, the course is designed to focus the conceptual ideas of computing and help students understand why certain tools or languages might be utilized to solve particular problems. The goal of Exploring Computer Science 2 is to develop in students the computational thinking practices of algorithm development, problem solving and programming within the context of problems that are relevant to the lives of today's students. Students will also be introduced to topics such as interface design, limits of computers and societal and ethical issues.

<b>Intended Grade Level</b>	7-9
Units of Credit	0.5
Core Code	35.02.00.00.008
Concurrent Enrollment Core Code	N/A
Prerequisite	Exploring Computer Science 1
Skill Certification Test Number	TBD
Test Weight	N/A
<b>License Type</b>	CTE and/or Secondary Education 6-12
<b>Required Endorsement(s)</b>	
Endorsement 1	Exploring CS, or
Endorsement 2	Computer Science Level 1, or
Endorsement 3	Computer Science Level 2

### STRAND 1

#### The student will understand Human Computer Interaction (1 week)

##### Standard 1

Students will experiment with internet search techniques, explore a variety of websites and web applications and discuss issues of privacy and security. Fundamental notions of Human Computer Interaction (HCI) and ergonomics are introduced.

- Analyze the characteristics of hardware components to determine the applications for which they can be used.

##### Standard 2

Students will learn that “intelligent” machine behavior is not “magic” but is based on algorithms applied to useful representations of information, including large data sets.

- Use appropriate tools and methods to execute Internet searches which yield requested data.
- Evaluate the results of web searches and the reliability of information found on the Internet.

##### Standard 3

Students will learn the characteristics that make certain tasks easy or difficult for computers, and how these differ from those that humans characteristically find easy or difficult.

- Explain the differences between tasks that can and cannot be accomplished with a computer.

##### Standard 4

Students will gain an appreciation for the many ways in which computing---enabled innovation have had an impact on society, as well as for the many different fields in which they are used. Connections among social, economic and cultural contexts will be discussed.

- Analyze the effects of computing on society within economic, social, and cultural contexts.
- Communicate legal and ethical concerns raised by computing innovation.
- Explain the implications of communication as data exchange.

### STRAND 2

#### The student will use Problem Solving (1 week)

##### Standard 1

Students will become “computational thinkers” by applying a variety of problem---solving techniques as they create solutions to problems that are situated in a variety of contexts.

- Name and explain the steps they use in solving a problem.
- Solve a problem by applying appropriate problem---solving techniques.
- Express a solution using standard design tools.

### Standard 2

The range of contexts motivates the need for students to think abstractly and apply known algorithms where appropriate, but also create new algorithms. Analysis of various solutions and algorithms will highlight problems that are not easily solved by computer and for which there are no known solutions.

- Determine if a given algorithm successfully solves a stated problem
- Create algorithms that meet specified objectives
- Explain the characteristics of problems that cannot be solved by an algorithm
- Compare the tradeoffs between different algorithms for solving the same problem

### Standard 3

This unit also focuses on the connections between mathematics and computer science.

- Explain the connections between binary numbers and computers.

### Standard 4

Students will be introduced to selected topics in discrete mathematics including Boolean logic, functions, graphs and the binary number system.

### Standard 5

Students are also introduced to searching and sorting algorithms and graphs.

## STRAND 3

### The student will understand Web Design (5 weeks)

#### Standard 1

Students will explore issues of social responsibility in web use.

- Create web pages to address specified objectives
- Create web pages with a practical, personal, and/or societal purpose

#### Standard 2

They will learn to plan and code their web pages using a variety of techniques and check their sites for usability.

- Select appropriate techniques when creating web pages
- Use abstraction to separate style from content in web page design and development
- Describe the use of a website with appropriate documentation

#### Standard 3

Students learn to create user-friendly websites.

## STRAND 4

### The student will understand Introduction to Programming (4 weeks)

#### Standard 1

Students are introduced to some basic issues associated with program design and development.

- Use appropriate algorithms to solve a problem

### Standard 2

Students design algorithms and create programming solutions to a variety of computational problems using an iterative development process in Scratch.

- Design, code, test, and execute a program that corresponds to a set of specifications, with practical, personal, and/or societal intent
- Select appropriate programming structures
- Locate and correct errors in a program
- Explain how a particular program functions
- Justify the correctness of a program

### Standard 3

Programming problems include mathematical and logical concepts and a variety of programming constructs.

## STRAND 5

**The student will understand Computing and Data Analysis (4 weeks)**

### Standard 1

Students will use computers to translate, process and visualize data in order to find patterns and test hypotheses.

- Describe the features of appropriate data sets for specific problems
- Use computers to find patterns in data and test hypotheses about data
- Justify conclusions drawn from data analysis

### Standard 2

Students will work with a variety of large data sets that illustrate how widespread access to data and information facilitates identification of problems

- Apply a variety of analysis techniques to large data sets
- Compare different analysis techniques and discuss the tradeoffs among them

### Standard 3

Students will collect and generate their own data related to local community issues and discuss appropriate methods for data collection and aggregation of data necessary to support making a case or facilitating a discovery.

## STRAND 6

**The student will understand Robotics (3 weeks)**

### Standard 1

Students explore how to integrate hardware and software in order to solve problems.

- Explain ways in which different hardware designs affect the function of a machine
- Describe the tradeoffs among multiple ways to program a robot to achieve a goal

### Standard 2

Students will see the effect of software and hardware design on the resulting product.

- Identify the criteria that describe a robot and determine if something is a robot
- Match the actions of the robot to the corresponding parts of the program
- Build, code, and test a robot that solves a stated problem

### Standard 3

Students will apply previously learned topics to the study of robotics.

### Work Place Skills

Communication, Problem Solving, Teamwork, Critical Thinking, Dependability