

Knight Foundation School of Computing and Information Sciences

Course Title: Computer Science Education for High School Children

Date: 05/07/2020

Course Number: IDC 4012C

Number of Credits: 4

Subject Area: Interdisciplinary Computing

Subject Area Coordinator: Mark Weiss
email: weiss@cis.fiu.edu

Catalog Description: Provide teachers with the knowledge of **advanced** Computer Science topics, as well as the pedagogy on how to teach the topics. Computer Science topics include how the internet works, big data, logic, programming languages such as Javascript (via an app-creating visual tool), and researching technology innovations.

Textbooks:

Online Curriculum: <https://studio.code.org/s/csp1> thru <https://studio.code.org/s/csp5>, <https://studio.code.org/s/csp-ap>, and <https://studio.code.org/s/csppostap> by Code.org,

References:

<https://curriculum.code.org/csp/>

Prerequisite Courses: None

Corequisites Courses: None

Type: General Elective

Prerequisite Topics: (none)

Course Outcomes:

- O1. Be able to explain the Internet, and how digital information is transferred.
- O2. Demonstrate ability to develop apps as games, animations, and interactive art, and use
Databases with Apps.
- O3. Be able to understand how data can be generated, analyzed, and used by society to solve
problems.
- O4. Prepare for AP CS Principles Exam.

This course should be taught by FIU faculty that have completed a 5-day Code.org workshop for High School Curriculum, as scheduled in the website:

<https://code.org/educate/professional-learning/cs-principles>

Outline

Topic	Number of Lecture Hours	Outcome
<ul style="list-style-type: none"> ● The Internet <ul style="list-style-type: none"> ○ Internet Simulator to Discover How Internet Works <ul style="list-style-type: none"> ▪ Sending binary messages, hexadecimal numbers, & text ▪ Broadcasting messages ▪ Routing messages using IP addresses ▪ Packets, Routing, Reliability ▪ Routing using DNS 	5	O1
<ul style="list-style-type: none"> ● App Development <ul style="list-style-type: none"> ○ Turtle Programming <ul style="list-style-type: none"> ▪ Creating functions & using parameters ▪ Top-Down Design ▪ Looping & Random Numbers ▪ Designing a Digital Scene ○ Designing Event-Driven Apps <ul style="list-style-type: none"> ▪ Buttons & Events ▪ Labels & Images ▪ Multi-screen Apps ▪ Controlling Memory with Variables ▪ User Input ▪ If-statements & Loops ▪ Arrays ▪ Functions ○ Creating a final project app 	25	O2
<ul style="list-style-type: none"> ● Data and Society <ul style="list-style-type: none"> ○ Text Compression ○ Lossy & Lossless File Compression ○ Data Visualizations – graphing, labeling ○ Summary/Pivot Tables ○ Big Data & its applications in different fields ○ Caesar Cipher ○ Vigenere Cipher ○ Public Key Encryption ○ Cybercrime ○ Data Security 	10	O3
<ul style="list-style-type: none"> ● AP CS Principles Exam Preparation <ul style="list-style-type: none"> ○ Explore Research Performance Task ○ Create Performance Task ○ Multiple Choice Exam 	5	O4

Computer Science Education for High School Children

Course Outcomes Emphasized in Laboratory Projects / Assignments

Projects and assignments will interactive lessons presented by students, as well as programming, projects done individually and collaboratively. Teaching demonstrations should be completed in a laboratory environment that includes short lectures by the instructor.

Outcome	
O1	Be able to explain the Internet, and how digital information is transferred, using Net Simulator widget.
O2	Demonstrate ability to develop apps as games, animations, and interactive art, and use Databases with Apps, using App Lab widget.
O3	Be able to understand how data can be generated, analyzed, and used by society to solve problems, using Google sheets.
O4	Be able to develop 2 performance tasks (PT) based on the AP College Board standards: Explore PT and Create PT Be able to pass the multiple-choice assessment covering all topics in course.

Oral and Written Communication:

- Written and oral discussions of social issues in computing

Theoretical Contents:

- Abstraction
- Algorithms

Problem Analysis Experiences:

None

Solution Design Experiences:

- Weekly teaching labs, teaching lessons, programming/puzzles

Assessment Plan for the Course & how Data in the Course are used to assess Program Outcomes

Student and Instructor Course Outcome Surveys are administered at the conclusion of each offering, and are evaluated as described in the School's Assessment Plan:

<https://abet.cs.fiu.edu/csassessment/>