Arthur Vining Davis High Impact Fellows Projects   High Impact Curriculum Fellows

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Exploring Computer Science: Coding Can Be Fun

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Exploring Computer Science

Coding can be fun!

Union County CATE Center

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Overview

The focus of this project is to adopt a course/curriculum that builds interest in computer science and appeals to high school students through a variety of programs and activities. One of our goals is to increase interest in computer science among high school students especially minority and female students. Students will learn how to use programming languages, utilize higher level problem solving and program robots using the skills they acquired. The course, Exploring Computer Science, gives students the opportunity to learn a variety of computer science topics and have fun doing it.

Timeline

The following is a projected timeline of units that will be covered along with the projects students will be working on.

Introduction to Programming: Scratch (four weeks)

Students will be introduced to Scratch, a lower level programming language that allows students to use a tile-based visual programming environment and toolkit to make games, animated stories, interactive art, and share with others. Students will be able to create geometric game, music player and a complex game using Scratch.

Introduction to Programming: Stencyl (three weeks)

Using Stencyl, students can create cross-platform games without code. Students will use the skills they learned in Scratch to create more advanced projects for iOS, Flash and Windows. Students will use computer programming to create a "Space Invaders" and "Mario" type games. Students will also use a peer-review process to learn from others.

Introduction to Programming: StarLogo (three weeks)

StarLogo gives students the chance to use a graphical programming language in a 3D environment. This program continues to challenge students in problem solving and continues prepare students for higher level programming. Students will create a complex game using 3D animation and utilize peer-programming.

High Level Language: Python (four weeks)

Students should be able to understand the concept of object oriented programming and transition to a higher level programming such as Python. Python is used in a variety of application domains such as web development and database access.

Optional Topics: Robotics (three weeks)

Of the optional units to choose from, we chose robotics because it allows students to use the programming languages learned and implement them into a programmable robot. They will create the program that manipulates the robot and be able to see their problem solving in action. Several companies in the area utilize robotics in manufacturing and we plan to visit one after the robotics unit.

Project Goals

- Increase interest in CS
- Increase diversity in CS
- Prepare students for Engineering, Manufacturing and CS careers
- Increase problem solving skills
- Prepare students for the increasing need for technology skills in careers

Budget

- Meeting Expenses - $50
- Travel - $50
  - Student fellow expenses
- Field Trip - $50
  - A field trip will be planned to a visit a local manufacturing plant that utilizes robotics
- Robots - $400
  - Purchase two robots valued at $200 each
- **Total Expenses - $550**

Standards

The following standards come from the CATE Standards:

[http://ed.sc.gov/agency/programs-services/148/documents/Exporing ComputerScience.pdf](http://ed.sc.gov/agency/programs-services/148/documents/ExporingComputerScience.pdf)

G. Introduction to Programming

H. High Level Language

(Optional Topics)
A. Robotics

Unit Schedule

I. **Introduction to Programming – Scratch (January 7th – January 28th)**

      Students will be able to: recognize, understand and apply:

1.	**Statements**	5.	**Variables**
2.	**Expressions**	6.	**Events**
3.	**Conditions**	7.	**Threads**
4.	**Loops**		

  A. Basics of Programming: January 7th and 8th

  B. Geometric game: January 9th –17th

  C. Music player: January 20th - 24th

     1. *Tori will assist on Monday, January 20th (tentative)*

  D. Complex game: January 27th – 31st

     1. *Peer-review process*

II. **Introduction to Programming – Stencyl (February 3rd – February 21th)**

      Students will be able to: recognize, understand and apply:

1.	**Behaviors**	4.	**Actors**
2.	**Events**	5.	**Animation**
3.	**Attributes**	6.	**Scenes**

  A. "Space Invaders": February 3rd – 11th

     1. *Tori will assist Monday February 3rd (tentative)*

  B. "Mario": February 12th – 21st

     1. *Peer-review process*

II. **Introduction to Programming – StarLogo (February 24st – March 12th)**

      Students will be able to: recognize, understand and apply:

1.	**?**	3.	**?**
2.	**?**	4.	**?**

  A. Complex Game

     1. *Tori will assist on Monday, February 24th (tentative)*

     2. *Peer-programming process*

II. **Assessments**

  A. Project based test: March 13th

  B. Traditional based test: March 14th

III. Higher Level Programming – Python (four weeks)

IV. Robotics: (three weeks)

  A. Field Trip: date and time to be determined later