CS 1050: CS PRINCIPLES

Semester Hours: 3.0  
Contact Hours: 3
Coordinator: Sankardas Roy
Text: Blown to Bits: Your life, liberty, and happiness after the digital explosion
Author(s): Abelson, H., Ledeen, K., & Lewis, H. R
Year: 2008

SPECIFIC COURSE INFORMATION

Catalog Description:
CS 1050 CS Principles (3): Computing as a creative process; Problem solving using abstraction; How data and information create knowledge; Algorithms and computer programs; Internet, digital devices and their impact on society; Privacy and security issues; Computation leading to innovations in other fields. Prerequisites: MATH 95 or higher.

Course type: Elective

SPECIFIC COURSE GOALS

- I can demonstrate computational thinking practices
- I can use the core ideas of computer science, such as abstraction, and algorithms
- I can do simple computer programming
- I can give an overview of the Internet and its impact to the human society
- I can discuss the privacy and security issues in using digital devices

LIST OF TOPICS COVERED

1. Connecting Computing (1.5 weeks)
   - Introduction to computers, digital devices, the Internet and Big Data
   - The structure of the Internet
   - How computation led innovations in different science fields
   - (Positive and negative) impact of computing and Internet on human society

2. Computational Artifacts (2 weeks)
   - Create a webpage using HTML
   - Data representation in digital devices: decimal to binary conversion, binary arithmetic, Base 16, and color (RGB), more
What is a computer program?

3. Abstraction in Art / Life / Programming (2 weeks)
   o Use of abstraction in computation or modeling
   o Representing information or knowledge for computational use

4. Computational Thinking (3 weeks)
   o Introduction to Algorithms
   o How to analyze a problem to design the algorithm for solving the problem
   o Example algorithm: How to repeat an operation by using the “conditional loop” concept
   o How to write a program implementing an algorithm (e.g. use of the loop construct)

5. Understanding popular algorithms (2 weeks)
   o How to find stuff: search algorithms (linear and binary search)
   o How to arrange stuff: sorting algorithms (insertion sort and selection sort)

6. Special hands-on programming experience (2 weeks)
   o Introduction to hands-on programming environments (e.g., robots, MIT Scratch lab), which enable programmers to create interactive stories, games, etc.

7. Secrecy and Privacy in the digital world (2 weeks)
   o Data theft and unintended information disclosure
   o Cryptography for data encryption.
   o Privacy issues related to the use of the Internet, online social networks, mobile devices, and the likes