CS 1050: POWER OF COMPUTING: THINK LIKE A COMPUTER

Semester Hours: 3.0
Contact Hours: 3
Coordinator: S. Roy
Text: Blown to Bits: Your life, liberty, and happiness after the digital explosion
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Year: 2008

SPECIFIC COURSE INFORMATION

Catalog Description:
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.

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

- Connecting Computing (~10%)
  - 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
• Computational Artifacts (~15%)
  o Create a webpage using HTML
  o Data representation in digital devices: decimal to binary conversion, binary arithmetic, Base 16, and color (RGB), more
  o What is a computer program?

• Abstraction in Art / Life / Programming (~15%)
  o Use of abstraction in computation or modeling
  o Representing information or knowledge for computational use

• Computational Thinking (~20%)
  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)

• Understanding popular algorithms (~15%)
  o How to find stuff: search algorithms (linear and binary search)
  o How to arrange stuff: sorting algorithms (insertion sort and selection sort)

• Special hands-on programming experience (~13%)
  o Introduction to hands-on programming environments (e.g., robots, MIT Scratch lab), which enable programmers to create interactive stories, games, etc.

• Secrecy and Privacy in the digital world (~12%)
  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