CS 1050: POWER OF COMPUTING: THINK LIKE A COMPUTER

Semester Hours: 3.0  Contact Hours: 3
Coordinator: Shuteng Niu
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:
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%)
  o Introduction to computers, digital devices, the Internet and Big Data
  o The structure of the Internet
  o How computation led innovations in different science fields
  o (Positive and negative) impact of computing and Internet on human society

• Computational Artifacts (~15%)
  o 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?

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

- Computational Thinking (~20%)
  - Introduction to Algorithms
  - How to analyze a problem to design the algorithm for solving the problem
  - Example algorithm: How to repeat an operation by using the “conditional loop” concept
  - How to write a program implementing an algorithm (e.g. use of the loop construct)

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

- Special hands-on programming experience (~13%)
  - 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%)
  - Data theft and unintended information disclosure
  - Cryptography for data encryption.
  - Privacy issues related to the use of the Internet, online social networks, mobile devices, and the likes