CSCI 70700 - Modern Topics in Computer Science

Department Of Computer Science

Hunter College, CUNY

Spring Semester 2022

Professor Genady Maryash

Office Hours: TBA And By Appointment

Course Description

This course will provide students with base knowledge in a number of the most important disciplines in computer science. Students will study and create working systems using a variety of tools, techniques, and technologies. Sample topics include functional programming, data mining, computer graphics, and artificial intelligence.

Grading

- 80% : Projects/programming assignments
- 20% : Participation

The topics class will require each student to work in a team to research and deliver a project on a topic in computer science that they select. The project will include both a GitHub repo consisting of the documentation and source code and a class presentation.

The project must:

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1. Exhibit that the participants have a knowledge and understanding of the topic.
2. Include code illustrating at least proof of concept on the selected topic.

3. Include an in class exercise or activity for the class to allow all students to explore t

4. Include a short homework assignment for the class to allow all students to explore the se
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By the end of this course, students will be able to:

- learn the fundamentals of each subfield studied in this course.
- use online and community resources to further their own professional development and study of computer science.

Texts

N/A

Standards note

Area	Standards Covered
DL	1,2,3,4,5,6,7
IC	1,2,4,5,6,7
CT	1,2,3,4,5,6,7,8,9,10
NSD	1,2,3,4,5
CY	1,2,3,4,5

`DL 1-7, IC 1,2,6  covered in preparation and development of student led topics. Additional s`

Topics

1. Course overview and Advanced recursion
   - Brief descriptions of each of the topics
   - Towers of Hanoi
     - advanced recursion
     - proof
     - intractable problems
   - Assignment: do preliminary research to select a core topic
   - Standards
     - CT 1,4,5,6,7,10
2. Computer networks
   - Networking fundamentals
   - Design of the internet
   - addresses / packets / communication
   - Assignment: continue research to select a core topic
   - Standards
     - NSD 1 - 5
3. Full Stack Web Development
   - Introduction to Flask
   - Web Hosting a Flask application
   - lab: select project teams
   - Assignment: Implement a simple Flask based web site
   - Standards
     - NSD 1 - 5
     - CY 1, 2, 3
     - IC 4, 6
4. Project development
   - Flask assignment review and discussion of accessibility
   - Lab: project development
   - Standards
     - CT 6
5. Project development

- Lab: project development

6. Project development
   - Lab: project development
7. Data Mining (Student led topic)
   - Activity: TBD (student generated)
   - Assignment: TBD (student generated)
   - Standards
     - IC 5, 7
     - CT 2, 3
8. Public Key Encryption (Student led topic)
   - Activity: TBD (student generated)
   - Assignment: TBD (student generated)
   - Standards
     - CY 1-5
     - IC 1,2,4
     - CT 4,6
9. Blockchain (Student led topic)
   - Activity: TBD (student generated)
   - Assignment: TBD (student generated)
   - Standards
     - IC 4
     - CY 1-5
10. Natural Language Processing (Student led topic)
    - Activity: TBD (student generated)
    - Assignment: TBD (student generated)
11. Databases and SQL (Student led topic)
    - Activity: TBD (student generated)
    - Assignment: TBD (student generated)
    - Standards
    - IC 7
12. Data Visualization (Student led topic)
    - Activity: TBD (student generated)
    - Assignment: TBD (student generated)
    - Standards
    - CT 2, 3
    - IC 7
13. Cipher Decryption / Recommender systems (Student led topic)
    - Activity: TBD (student generated)
    - Assignment: TBD (student generated)
    - Standards
    - CY 1-5 (emphasis on 3)
14. Genetic Programming (Student led topic)
    - Activity: TBD (student generated)
    - Assignment: TBD (student generated)
    - Standards
    - CT 4-9

- IC 7

15. Classic AI - Search (BFS, DFS, A*) (Student led topic)
    - Activity: TBD (student generated)
    - Assignment: TBD (student generated)

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