CSC 215 Survey of Computer Science II  

4 cr.

Catalog description:
This course builds on CSC 200A and provides an overview of selected Computer Science topics that are more technical and advanced than those discussed in the earlier course. Topics include a detailed discussion of the binary, octal, and hexadecimal numeration systems, the machine representation of data and instructions, the design of a typical computer chip, programming in a simplified machine language, and such application areas as robots and embedded systems (programming and construction), artificial intelligence, computability theory and Turing machines, and an introduction to networks, including the Internet model. Four lecture hours per week plus laboratory work outside of class.

Prerequisites: CSC 201J, and a grade of C+ or better in CSC 200A.

Goals:
The aims of this course are to help the student to gain an appreciation for the breadth and variety within the computer science field and to be better prepared for the technical treatments presented in later courses. Upon completion of the course, a student should be able to do the following:

CG01: to build an in-depth understanding for machine representation of data and instructions;
CG02: to build detailed understanding of several major application areas of computer science;
CG03: to provide a capability to solve problems in each topic area.

Objectives:
Upon successful completion of the course, a student will have:

CO01: carry out the conversion of text and numeric data between a human readable form and binary form such as ASCII characters, decimal negative numbers to 2's complement binary numerals, and exponential numbers to binary floating point;
CO02: write simple machine language programs for a simple computer chip and memory;
CO03: construct simple sequential logic circuits;
CO04: solve problems from selected areas in artificial intelligence;
CO05: solve problems from selected areas of computational theory;
CO06: solve problems involving embedded computer systems;
CO07: solve problems involving networks of all types including the Internet;
CO08: solve problems in distributed algorithms, graphics, and human/computer interface design;
CO09: understand syntax diagrams for the specification of language elements;
CO10: design simple web pages.

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Topics: (core CAC BoK units are bold, non-core (nc) are normal typeface)
• review of computer system components
  AR1(0.5)
• computer hardware and data representation
  AR1(1.5), AR2(2), AR4(0.5), AR5(0.5)
  • logic gates and circuits
  • binary, octal, decimal, and hexadecimal numeration systems and conversions
  • machine representation of numbers and conversions to and from decimal
  • integers and 2's complement
  • floating point numbers (including the IEEE 754 standard)
  • computer arithmetic
  • CPU structure
  • main memory structure and details of construction and operation
  • details of magnetic and optical media
• computer software
  AR3(1.5), AR4(0.5), AR6(1.5)
  • memory addresses
  • program counter, instruction register
  • the instruction cycle
  • instruction set, op codes, operands
  • assembly languages
  • high-level programming languages
    • language specification: syntax diagrams, EBNF
    • lexical analysis, parsing, code generation
  • system tools: editors, linkers, loaders, other utilities
• artificial intelligence
  IS1(1)
  IS6 (1) (not core)
  • goals and issues
  • intelligent agents
  • solving problems by searching
    • breadth-first search
    • depth-first search
    • heuristic functions
  • logical induction
  • logical deduction
  • formal logic
  • fuzzy logic
  • machine learning
  • expert systems
  • neural networks
  • Turing test
• computation theory
  AL1(0.5)
  AL5(2)
  AL6(2) (not core)
  • big-O algorithm analysis
  • finite automata, Turing machines, the Church-Turing thesis
  • computability, the P and NP classes
• embedded systems
  OS9(1.5)
  IS10(1) (not core)
  • microcontrollers
  • real-time systems
• networks
  NC1(1), NC2(1.5), NC9(1.5) (not core)
  • network models and protocols
    • TCP/IP
    • UDP
    • CSMA/CD
    • CSMA/CA
  • HTML, JavaScript
  • circuit switching, packet switching
  • wireless network
NC4(2.5)
NC2(0.5)
NC9(2) (not core)
Assignments: Extensive reading assignments in one or more textbooks cover the fundamental vocabulary and descriptive material. Written assignments, both computational and analytical, are used to deepen the student's understanding of fundamental ideas. Each assignment has a specific due date, with a short grace period during which the assignment may be submitted for reduced credit. When the grace period has expired, the assignment will no longer be accepted, and a student who has failed to submit the assignment will have a penalty deducted from the term point-total.

Quizzes, Tests and Examinations: There are two one-hour examinations, and a comprehensive two-hour final examination. Note: Make-ups are given for missed examinations only under exceptional and documented circumstances.

Grading: Final grades will be determined using the following approximate weights: homework, 60%; hour examinations, 20% (10% each); final examination, 20%.

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### Assessment Mechanism / Course Objective matrix

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Bibliography:


Galitz, Wilbert O. *The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and...*
Tittel, Ed & Noble, Jeff. HTML, XHTML & CSS For Dummies. Sixth Edition. For Dummies Publisher, 2008.