CSC 200A Survey of Computer Science

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Section | Time | Room | Final Exam
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n | days and times | location | date and time

Catalog description:
This course provides an overview of fundamental areas within the field of Computer Science, introducing basic vocabulary, central concepts, and typical applications. The areas surveyed include computer hardware, computer arithmetic, operating systems, programming constructs, programming languages, information storage and retrieval, databases, networking, and the social context of computing. Three lecture hours per week. This course satisfies the Computer Literacy Competency-Based Skills requirement.

Prerequisites: fulfillment of the Basic Mathematics Competency Based Skills requirement and ability to use standard computer software (e.g., operating system features, word processing, email, and web browsers).

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. Specifically, the goals are:

CG01: to acquaint the student with many of the major subdivisions within academic computer science;
CG02: to provide a standard descriptive vocabulary for these topic areas;
CG03: to provide a survey of the most important concepts in each topic area.

Objectives:
Upon successful completion of this course the student will have demonstrated the ability to:

CO01: use correct technical terminology to name and describe the principal hardware and software components of a computer system;
CO02: understand the conversion of text and numeric data between "human readable" form and binary form;
CO03: understand and explain the instruction cycle ("fetch/execute cycle") and its role in the operation of a computer system;
CO04: use correct terminology to describe the various measurements of capacity and speed relating to a computer system;
CO05: name and understand the principal classifications of files and software, and the differences and distinctions among them;
CO06: name and explain the four principal programming paradigms;
CO07: understand the basics of computer networks;
CO08: name the principal functional components of an operating system and describe the main responsibilities of each one;
CO09: give a general description of such topic areas as database systems and artificial intelligence;
CO10: give a general description of such topics as software piracy, liability, privacy concerns, and computer security, and current thinking and controversies in each area.

Program Outcome vs. Course Objectives matrix

<table>
<thead>
<tr>
<th>Program Objective (condensed form)</th>
<th>CO01</th>
<th>CO02</th>
<th>CO03</th>
<th>CO04</th>
<th>CO05</th>
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<th>CO07</th>
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<tbody>
<tr>
<td>PO-A: apply knowledge of computing and math</td>
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<td>PO-B: analyze a problem and define its computing requirements</td>
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<td>PO-C: design, implement and evaluate applications</td>
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Program Objective (condensed form)

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<td>function effectively in teams to accomplish a common goal</td>
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<td>professional, ethical, and social responsibilities</td>
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<td>communicate effectively with a range of audiences</td>
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<td>local and global impact of computing on people and society</td>
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<td>use current techniques, skills, and tools</td>
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<td>apply design and development principles in constructing software</td>
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Note - full statements of the Program Outcomes (program objectives) for the Computer Science Major can be found in the document Computer Science Major Program Educational Objectives and Program Outcomes on the Assessment page of the Computer Science Major (cs.salemstate.edu)

Topics:

- introduction: SP1(1)
  - history of computing (survey)
  - What is a computer? (operational definition)
  - fundamental computer capabilities (read, write, store, compute, compare)
  - components of a typical computer

- the role of the computer SP2(3)
  - as a communications tool
  - as an information resource
  - as a problem-solving tool
  - as a real-time control mechanism

- computer hardware AR1(2), AR2(4), AR3(1), AR4(1), AR7(0.5)
  - logic gates and circuits
  - binary, octal, and hexadecimal numeration systems
  - machine representation of numbers
    - integers
    - 2's complement representation of negative numbers
    - floating point numbers
  - computer arithmetic
  - CPU structure
  - main memory structure
  - secondary storage devices (disk, tape)
  - I/O devices and their operation
  - multiprocessor systems
  - parallel processing

- communicating with a computer OS8(1), IM12(0.5) (not core)
  - files (text vs. binary, sequential vs. direct)
  - organization of text data (items, fields, records, files)
  - coding of text (ASCII, Unicode, etc.)
  - markup languages, hypertext
  - machine language
    - memory addresses
    - program counter, instruction register
    - the instruction cycle
    - instruction set, operation codes
  - symbolic languages
    - assembly languages
  - symbolic languages
    - assembly languages

- communicating with a computer AR3(2)
  - machine language
    - memory addresses
    - program counter, instruction register
    - the instruction cycle
    - instruction set, operation codes
  - symbolic languages
    - assembly languages
• high-level programming languages
  → language specification: syntax diagrams, EBNF
  → language translation: assemblers, compilers, interpreters
  → lexical analysis, parsing, code generation
• programming paradigms
  → procedural, declarative, functional, object-oriented
  → programming languages, past and present
• problem-solving, program design and programming
  ° data types, variables, constants
  ° control structures
  ° modules
  ° problem analysis
  ° requirements and specifications
  ° solution design
  ° algorithms
  ° software testing and evolution
  ° the human dimension of software: clarity & convenience of use
• information storage and retrieval
  ° goals
  ° conceptual vs. physical organization of data
  ° data structures
  ° databases, database systems, and database management
  ° database query languages
• operating systems
  ° the purposes of an operating system
  ° resource allocation
  ° system tools: editors, linkers, loaders, other utilities
  ° scheduling
  ° virtual memory
• artificial intelligence
  ° goals and issues
  ° expert systems
• the social context of computing
  ° appropriate vs. inappropriate
  ° codes of ethics for computer users and professionals
  ° intellectual property standards
  ° privacy, civil liberties

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 and examinations: There are periodic short quizzes (usually five quizzes, with the lowest quiz grade dropped), two one-hour examinations, and a comprehensive two-hour final examination.

No make-ups are given for missed quizzes or examinations.

Grading: Final grades will be determined using the following approximate weights: homework, 50%; quizzes, 20%; hour examinations, 18% (9% each); final examination, 12%.

Course Objective / Assessment Mechanism matrix

<table>
<thead>
<tr>
<th></th>
<th>Homework Assignments</th>
<th>Quizzes</th>
<th>Hour Examinations</th>
<th>Final Examination</th>
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<td>PL4 (0.5)</td>
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<td>PF1 (2)</td>
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<td>SE5 (0.5)</td>
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<td>PF2 (2)</td>
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<td>SE6 (0.5), SE7 (0.5)</td>
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<td>HC1 (0.5)</td>
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<td>IM1 (0.5)</td>
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<td>PF3 (1)</td>
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<td>IM2 (0.5)</td>
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<td>IM5 (1) (not core)</td>
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<td>OS1 (2)</td>
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<td>SP4 (1)</td>
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<td>SP7 (2.0)</td>
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Bibliography:


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**Academic Integrity Statement:**

“Salem State University assumes that all students come to the University with serious educational intent and expects them to be mature, responsible individuals who will exhibit high standards of honesty and personal conduct in their academic life. All forms of academic dishonesty are considered to be serious offenses against the University community. The University will apply sanctions when student conduct interferes with the University primary responsibility of ensuring its educational objectives.” Consult the University catalog for further details on Academic Integrity Regulations and, in particular, the University definition of academic dishonesty.

The Academic Integrity Policy and Regulations can be found in the University Catalog and on the University website (http://catalog.salemstate.edu/content.php?catoid=13&navoid=1295#Academic_Integrity). The formal regulations are extensive and detailed - familiarize yourself with them if you have not previously done so. A concise summary of and direct quote from the regulations: "Materials (written or otherwise) submitted to fulfill academic requirements must represent a student's own efforts". *Submission of other's work as one's own without proper attribution is in direct violation of the University's Policy and will be dealt with according to the University's formal Procedures. Copying without attribution is considered cheating in an academic environment - simply put, do not do it!*
University-Declared Critical Emergency Statement:

In the event of a university-declared emergency, Salem State University reserves the right to alter this course plan. Students should refer to www.salemstate.edu for further information and updates. The course attendance policy stays in effect until there is a university-declared critical emergency.

In the event of an emergency, please refer to the alternative educational plans for this course, which will be distributed via standing class communication protocols. Students should review the plans and act accordingly. Any required material that may be necessary will have been previously distributed to students electronically or will be made available as needed via email and/or Internet access.

Equal Access Statement:

"Salem State University is committed to providing equal access to the educational experience for all students in compliance with Section 504 of The Rehabilitation Act and The Americans with Disabilities Act and to providing all reasonable academic accommodations, aids and adjustments. Any student who has a documented disability requiring an accommodation, aid or adjustment should speak with the instructor immediately. Students with Disabilities who have not previously done so should provide documentation to and schedule an appointment with the Office for Students with Disabilities and obtain appropriate services."

Note: This syllabus represents the intended structure of the course for the semester. If changes are necessary, students will be notified in writing and via email.