Computer Science Department
cs.salemstate.edu

CSC 105 Survey of Computer Science **4 cr.**

Instructor: TBA **Office:** location **Phone:** (978) 542-extension
email: TBA@salemstate.edu **Office Hours:** days and times

Section	Time	Room	Final Exam
nn	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, networking, intelligent systems, computer graphics, and the social context of computing. Four lecture hours per week.

Prerequisite: 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 provide an overview of fundamental concepts in computer science;
CG02: to introduce key application areas of computer science;
CG03: to recognize problems and appreciate solution strategies in each topic area covered.

Objectives:

Upon completion of this course, students will have demonstrated the ability to:

CO01: use correct terminology to name the physical and software components of a computer system;
CO02: explain how data is represented in a computer system;
CO03: recognize and utilize fundamental algorithm patterns;
CO04: explain basic terminology and concepts of computer networks and security;
CO05: explain basic terminology and concepts of operating systems;
CO06: design solutions to problems from selected areas of artificial intelligence, computer graphics, and human-computer interaction;
CO07: give a general description of professional ethics and intellectual property standards.

Program Outcome vs. Course Objectives matrix

Program Objective (condensed form)	CO01	CO02	CO03	CO04	CO05	CO06	CO07
PO-A: apply knowledge of computing and math	✓	✓	✓	✓	✓	✓	✓
PO-B: analyze a problem and define its computing requirements			✓				
PO-C: design, implement and evaluate applications							
PO-D: function effectively in teams to accomplish a common goal							
PO-E: professional, ethical, and social responsibilities							✓
PO-F: communicate effectively with a range of audiences							
PO-G: local and global impact of computing on people and society							✓
PO-H: need for continuing professional development							
PO-I: use current techniques, skills, and tools			✓				
PO-J: apply theory and principles to model and design systems							
PO-K: apply design and development principles in constructing software							
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
    - "Computing" and its sub-disciplines
    - An overview of computing and computer systems
- Data representation **AR2(2.5)**
    - Introduction to binary and hexadecimal numeration systems

- Data representation: a brief introduction to machine representation of text (ASCII/Unicode), images, and audio.
- Basic Organization of the Von Neumann Machine **AR3(2.5)**
- Stored program concept
- Fetch-Decode-Execute Cycle

- Programming Languages
  - Machine language **AR3(1.5)**
    - Memory addresses, program counter, instruction register
  - Assembly language **AR3(0.5)**
  - High-level programming languages **PL1(0.5)**
    - Programming paradigms
- Problem-solving with Algorithms **AL1(2), SDF1(1.5)**
  - Problem analysis and solution design
  - Algorithms/Pseudo code/Flowcharts
  - Basic Algorithm Analysis
  - Fundamental algorithm patterns: greedy, divide and conquer, dynamic (retrospective)
  - Differences among best, expected, and worst case behaviors of an algorithm
  - Big O notation
  - Complexity classes such as constant, logarithmic, linear, quadratic, and exponential
  - Empirical measurements of performance
- Information storage and retrieval
  - Conceptual vs. physical organization of data **IM1(0.5)**
  - Databases, database systems, and database management **IM2(0.5)**
- Overview of Operating Systems
  - The purposes of an operating system **OS1(2)**
    - Resource allocation
    - Scheduling
- Introduction to Modeling and Simulation **CN(1)**
  - Models as abstractions of situations
  - Simulations as dynamic modeling
  - Simulation techniques and tools
  - Presentation of results in a form relevant to the system being modeled
- Computer networks
  - Organization of the Internet **NC1(2)**
    - Switching Techniques: Circuit switching, Packet switching
    - Physical pieces of a network: host, routers, switches
    - TCP/IP vs. OSI model
  - Introduction to the TCP/IP protocol suite and important protocols **NC7(0.5), NC5(0.5), NC2(4)**
    - HTTP
    - DNS
    - TCP vs. UDP
    - IP
    - Ethernet: CSMA/CD
    - Wireless networks: CSMA/CA
  - Reliable Data Delivery **NC3(2)**

        - Error Control
        - Flow Control
- Information Assurance and security
    - Foundational concepts in security: CIA, threats, authentication, ethics **IAS1 (2)**
    - Principles of Secure Design **IAS2 (2)**
    - Defensive Programming **IAS3 (1.5)**
- Computer Graphics **GV1(2)**
    - Fundamental Concepts
    - Introduction to Modeling and Rendering
- Intelligent Systems
    - Fundamental Issues **IS1(2)**
    - Overview of AI **IS1(1)**
        - Turing Test
        - Agents, nature of agents
    - Basic Search Strategies **IS2(4)**
        - Problem spaces
        - Problem solving by search
        - Uninformed Search and Informed Search
    - Basic Knowledge Representation and Reasoning **IS3(2)**
        - Review of propositional and predictive logic
        - Forward and backward chaining
    - Applications **IS4(1)**
- Human-Computer Interaction
    - Foundations **HCI1(2)**
        - User interface
        - Measures for evaluation
        - Usability heuristics
        - Cognitive models
        - Social models
        - Accessibility
- The social context of computing
    - Appropriate vs. inappropriate **SP1(0.5)**
    - Professional Ethics **SP3(4)**
        - Community values
        - Professional certification, codes of ethics, conduct, and practice
        - Accountability, responsibility and liability
        - Ethical dissent and whistle-blowing
        - Dealing with harassment and discrimination
        - Ergonomics and healthy computing environments
    - Intellectual property standards **SP4(1.5)**
    - Privacy and civil liberties **SP5(2)**

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.

Exams and quizzes: There will be periodic short quizzes, one mid-term exam and a comprehensive written two-hour final examination. No make-ups are given for missed quizzes or examinations.

Grading:

The course grade will be determined using the following approximate weights: Homework: 30%; Quizzes: 20%; Midterm Exam : 25%; Final Exam : 25%.

Course Objective / Assessment Mechanism matrix

	Written Homework	Quizzes	Examinations
CO01	✓	✓	✓
CO02	✓	✓	✓
CO03	✓	✓	✓
CO04	✓	✓	✓
CO05	✓	✓	✓
CO06	✓	✓	✓
CO07		✓	✓

Bibliography:

Anderson, Greg; Ferro, David; Hilton, Robert. **Connecting with Computer Science. Second Edition**. Thomson Course Technology, 2010.

Brookshear, J. Glenn. **Computer Science: An Overview**. **12th Edition**. Addison-Wesley, 2014.

Dale, Nell; Lewis, John. **Computer Science Illuminated**. **Sixth Edition**. Jones & Bartlett,2015.

Kurose, James and Ross, Keith. **Computer Networking: A Top-Down Approach**. **Seventh Edition**. Pearson, 2016.

Lucci, Stephan and Kopec, Danny. **Artificial intelligence in the 21st century**. **Second Edition**. Mercury Learning & Information, 2015.

Marschner, Steve and Shirley, Peter. **Fundamentals of Computer Graphics. Fourth Edition**. CRC Press, 2015.

Russell, Stuart and Norvig, Peter. **Artifical Intelligence: A Modern Approach. Third Edition**. Pearson, 2009.

Schneider, G. Michael and Gersting, L. Judith. **Invitation to Computer Science. Seventh Edition**. Cengage Learning, 2015.

Tanenbaum, S. Andrew and Wethrall, J. David. **Computer Networks. Fifth Edition**. Pearson, 2010.

Academic Integrity

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 offences 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.