



Program Objective (condensed form)	CO01	CO02	CO03	CO04	CO05	CO06	CO07	CO08
<b>PO-F:</b> communicate effectively with a range of audiences								
<b>PO-G:</b> local and global impact of computing on people and society								
<b>PO-H:</b> need for continuing professional development							✓	
<b>PO-I:</b> use current techniques, skills, and tools			✓	✓	✓	✓	✓	
<b>PO-J:</b> apply theory and principles to model and design systems		✓	✓	✓	✓	✓		
<b>PO-K:</b> 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 <i>Computer Science Major Program Educational Objectives and Program Outcomes</i> on the Assessment page of the Computer Science Major ( <a href="http://cs.salemstate.edu">cs.salemstate.edu</a> )								

### Topics:

- Computers and their applications **PL2(1)**
  - hardware and software
- Data representations **AR2(4)**
  - text
  - numeric data types
    - non-negative integers
    - signed integers
    - range and scaling
    - real numbers
  - evaluation of expressions
- Logic level design **AR1(3)**
  - elementary logic gates
  - combinational logic design
  - elementary sequential circuits
- Computer circuits **AR1(4)**
  - electrical properties
  - combinational logic implementations
  - important combinational circuits
  - sequential circuits
  - link connections
  - integrated circuits and technologies
- Fundamental computer operations **AR3(3), AR6(2)**
  - machine language and assembler language instructions
  - stacks
  - procedures
  - macros
  - instruction execution time
- Program creation
  - assemblers
  - compilers
  - linking and address adjustment
  - loading and address adjustment
- Input/output programming **AR5(1.5)**
  - programmed I/O
  - interrupt I/O
  - direct memory access
  - I/O elements
- Processing elements **AR3(8), AR6(3)**
  - macroinstruction execution
  - internal bus transfers

- detailed internal architecture example
- microcontrol
- reduced instruction set computers (RISC)
- packaging
- Links and interfaces **AR5(1.5)**
  - system buses
  - interfaces
  - data links
- Memory hierarchy **AR4(2.5)**
  - mass storage
  - main memory
  - multiple-port memory
  - cache memory
  - hierarchy design
- Memory management **AR4(2.5)**
  - mass storage management
  - main memory management
  - memory management hardware
  - virtual memory
- Operating systems **AR6(2)**
  - uniprogramming systems
  - multiprogramming systems
  - organization of a multiprogramming system
  - sharing resources
- Parallel processing **AR7(3)**
  - multiprocessing
  - pipelining
  - vector and matrix processing
  - high-performance computing

This course provides an implementation-independent treatment of the subject, emphasizing general and widely applicable principles rather than focusing on implementation methods, which may be specific to a particular type or model of computer. To give students hands-on experiences, laboratory activities are used in the course. Among these laboratory activities, at least 2 require students to work in teams to accomplish larger-scale assignments.

The course grade will be determined using the following approximate weights: final examination - 25%, midterm examination - 25%, laboratory activities - 25%, other tests, quizzes, and written homework - 25%.

#### Course Objective / Assessment Mechanism matrix

	Homework	Exams	Laboratory Activities
CO01	✓	✓	✓
CO02	✓	✓	✓
CO03	✓		✓
CO04			✓
CO05	✓	✓	✓
CO06	✓	✓	
CO07	✓	✓	
CO08			✓

## Bibliography:

- Baer, Jean-Loup. **Microprocessor Architecture: From Simple Pipelines to Chip Multiprocessors**, Cambridge University Press, 2010.
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- Carpinelli, John. **Computer Systems Organization and Architecture. First Edition**, Addison-Wesley, 2001.
- Hamacher, Carl; Vranesic, Zvonko; Zaky, Safwat; Manjikian, Naraig. **Computer Organization and Embedded Systems, Sixth Edition**, McGraw-Hill, 2012.
- Hennessy, David; Patterson, John. **Computer Organization and Design: The Hardware/Software Interface. Fourth Edition**. Morgan Kaufmann, 2009.
- Hearing, Vincent P.; Jordan, Harry F. **Computer Systems Design and Architecture, Second Edition**, Prentice Hall, 2004.
- Jin, Lan; Hatfield, Bo, **Computer Organization: Principles, Analysis & Design, First Edition**, Tsinghua University Press, 2004.
- Marcovitz, Alan B. **Introduction to Logic and Computer Design, Third Edition**, McGraw Hill, 2008
- Ramachandran, Umakishore; Leahy, William D. Jr. **Computer Systems: An Integrated Approach to Architecture and Operating Systems, First Edition**, Addison Wesley, 2011.
- Shen, John Paul, Lipasti, Mikko H. **Modern Processor Design: Fundamentals of Superscalar Processors, First Edition**, McGraw Hill, 2005.
- Stallings, William. **Computer Organization and Architecture. Eighth Edition**. Prentice-Hall, 2009.
- Tanenbaum, Andrew. **Structured Computer Organization. Fifth Edition**. Prentice-Hall, 2005.
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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 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](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](http://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.