CSC475 Distributed and Cloud Computing 3 cr.

Instructor: TBA  
Email: TBA@salemstate.edu

Office: location  
Office Hours: days and times

Phone: (978) 542-extension

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<th>Section</th>
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Catalog description:
This course introduces the design principles, system architectures and innovative applications of parallel, distributed, and cloud computing systems. It aims to acquaint students with supercomputers, distributed and cloud computing systems for high-performance computing, research, e-commerce, social networking, and web-scale Internet applications. Topics include clustering, virtualization, cloud platform architecture, service-oriented architecture, cloud programming, security in distributed and cloud computing, and the Internet of Things. Software development platforms and tools from several leading distributed and cloud computing vendors are used to gain hands-on experiences. Three lecture hours per week, plus programming work outside of class.

Prerequisite: CSC 381.

Goals:
The goals of this course are:

- CG01: To introduce students to the main concepts and techniques of distributed and cloud systems.
- CG02: To foster an understanding of the fundamental issues among various parallel, distributed and cloud applications.
- CG03: To provide information in sufficient depth to allow students to evaluate existing distributed and cloud systems or design new ones.

Objectives:
Upon successful completion of this course a student will have:

- CO01: mastered terminology and basic concepts of general characteristics of parallel, distributed and cloud systems
- CO02: extended his/her previously-learned basic knowledge in the subject areas of Object-Oriented Programming, Operating Systems and elementary Computer Architecture into those aspects of computer networks relevant to distributed and cloud computing systems.
- CO03: gained hands-on experience in development of distributed algorithms, security and interfaces.
- CO04: chosen a course project in one of the subfields of distributed and cloud computing system design, read and synopsized journal/magazine articles in the selected subfield, achieved the proposed learning goals of the project, and given a formal presentation of the completed projects

Student Outcome vs. Course Objectives matrix

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Note:
SO-1 Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
SO-2 Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
SO-3 Communicate effectively in a variety of professional contexts.
SO-4 Recognize professional responsibilities and make informed judgements in computing practice based on legal and ethical principles.
SO-5 Function effectively as a member or leader of a team engaged in activities appropriate to the program’s discipline.
SO-6 Apply computer science theory and software development fundamentals to produce computing-based solutions.

Topics:

- Parallel and Distributed Computing Fundamentals
  - Multiple simultaneous computations
  - Goals of parallelism versus concurrency
  - Parallelism, communication, and coordination
  - Parallel computing vs. distributed computing
- Parallel Decomposition and Programming
  - Task-based decomposition vs. data-parallel decomposition
  - Independence and partitioning
- Communication and Coordination
  - Shared memory
  - Consistency
  - Message passing
- Systems Modeling, Clustering, and Virtualization
  - Distributed System Models and Enabling Technologies
  - Computer Clusters for Scalable Parallel Computing
  - Virtual Machines and Virtualization of Clusters and Data Centers
- Computing Clouds, Service-Oriented Architecture, and Programming
  - Cloud Platform Architecture over Virtualized Data Centers
  - Service-Oriented Architectures for Distributed Computing
  - Cloud Programming and Software Environments
- Grids, P2P, and The Future Internet
  - Grid Computing Systems and Resource Management
  - Peer-to-Peer Computing and Overlay Networks
  - Ubiquitous Clouds and the Internet of Things

Course Requirements:

- Examinations:
  There will be a midterm examination and a final examination, counting 20% and 25%, respectively.

- Homework Assignments:
  There will be a set of homework assignments given by the instructor.

- Programming Projects:
  There will be a set of programming assignments given by the instructor. Students are responsible for completing these assignments outside class.

- Course Project:
  There will be a single course project given by the instructor. The detailed requirements will be given early in the semester so that students can start planning early. The project may take a number of different formats defined by either the instructor or initiated by a student with the approval of the instructor.

Grading:
Homework Assignments 10%
Programming Projects 15%
Programming Exercises 15%
Course Project 15%
Midterm Examination 20%
Final Examination 25%

Course objectives will be assessed as specified by the following table:

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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 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.

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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.

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 all regular class communication mechanisms – email and the class website.