Syllabus for CS 496/522 – Cloud Computing

Department of Computer Science, New Mexico State University

Instructor: Satyajayant Misra
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Course Aims and Objectives:

CS 496/522 is an introductory course in Cloud Computing and accompanying Edge Computing. The aim of this course is to introduce fundamental concepts in cloud computing, such as software defined networking, cloud infrastructure, programming models, service models, cloud security, and concepts in cloudlets and edge computing. The emphasis of the course will be on the understanding the concepts and the engineering trade-offs involved in the design of cloud computing systems. In this course, we will specifically look at cloud deployment models, cloud service models (software-as-a-service, infrastructure-as-a-service, protocol-as-a-service), cloud architecture, cloud-edge security, service level agreements, and load balancing in cloud and datacenters. To improve understanding of the concepts, several multi-week projects including design and implementation will be assigned.

The goal is for the students to learn about cloud computing, especially what are their fundamental components, how these components interact, and how the technology is evolving for the future (edge computing, cloudlets, mobile edge computing, etc.).

ABET Learning Objectives:

- Understand the role of cloud computing.

- Understanding the role of IoT.

- Understand security techniques in IoT.

- Understand security techniques in cloud.

- Be able to summarise the features and associated risks of different cloud deployment and service models.

- Design a model or prototype as a solution of the identified problem.

- Improve student awarness about advanced topics.

Pre-requisites: Knowledge of C/C++, Python programming language and basic Linux commands is essential. A basic understanding of Operating Systems and Computer Networking is desired.

Textbooks:

- Cloud Computing: A Hands-on Approach, Arshdeep Bagha and Vijay Madisetti, (2014) ISBN-13: 978-0996025508.

- Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS), first edition, ISBN-13: 978-1118617618, Wiley (recommended).

Course Website: Refer to NMSU Canvas.

Evaluation Components (tentative):

- **Homework Assignments (3 HWs - 25%):** To be completed individually.

- **Programming Projects (2 or 3 - 35%):** In groups of two or less.

- **Midterm (20%):** Closed books and notes. Course covered till date.

- **Final Exam (20%):** Closed books and notes. Covers all material. Emphasis on the parts after the midterm.

The percentage reflects that of the maximum possible points. There will be no extra-credits for the class. No make-ups will be granted for the exams under any circumstances.

Grading Policy:

1. All programming projects and assignments need to be done in C/C++ or Python. Programs written in any other languages will not be graded.

2. All assignments and projects must be submitted through Canvas (learn.nmsu.edu). Assignments must be typed; you can submit written assignments at your own risk. If we can't read it, we won't grade it! Documented code of programming projects must be submitted through Canvas.

3. Assignments and projects need to be submitted by the specified deadline, on the day of the submission. No late submissions will be allowed, unless prior instructor approval is obtained.

4. No collaboration is allowed in the homeworks or midterm and final exams. You are required to do your own work and submit only your own work. **Cheating in any form will not be tolerated**. *The individuals involved in cheating will be awarded a grade of F in the course and disciplinary actions will be initiated against them, in accordance with the related university policies.* Any external source used for answering the evaluation components, such as source codes, documents, papers, etc., should be cited. Failure to do so amounts to plagiarism. Refer to the definition of plagiarism by the university (`http://lib.nmsu.edu/instruction/plagiarismforstudents.htm`)

5. The guidelines for academic conduct are present in the university catalogs (`http://www.nmsu.edu/%7Evpsa/SCOC/misconduct.html`). Any violation of the guidelines will result in a grade of F in the course, in addition, it may attract further sanctions by the university.

Non-Discrimination:
If you have any questions about NMSUs Non-Discrimination Policy and complaints of discrimination, including sexual harassment, you may call Jerry Nevarez, Director of Institutional Equity, at 575-646-3635 with your questions.

Disability:
If you have or believe you have a disability and would benefit from any accommodations, you may wish to self-identify. You may call Michael Armendariz, Coordinator of Services for Students with Disabilities

(SSD), at 575-646-6840 with questions you may have on student issues related to the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act of 1973. All medical information will be treated confidentially. If you have already registered with SSD, please make sure that your instructor receives a copy of the accommodation memorandum from SSD within the first two weeks of classes. It is your responsibility to inform either your instructor or SSD representative in a timely manner if services/accommodations provided are not meeting your needs. If you have a condition which may affect your ability to exit safely from the premises in an emergency or which may cause an emergency during class, you are encouraged to discuss any concerns with the instructor and/or Michael Armendariz, SSD Coordinator.

Tentative List of Topics: Introduction to Cloud Computing – *Chapter 1*; Cloud Concepts and Technologies – *Chapter 2*; CLoud Services and Platforms – *Chapter 3*; Hadoop and MapReduce Concepts – *Chapter 4*; Cloud Application Design – *Chapter 5*; Python for Cloud – *Chapter 7*; Big Data Analytics – *Chapter 9*; Multimedia Cloud – *Chapter 10*; Cloud Application Benchmarking and Tuning – *Chapter 11*; Cloud Security – *Chapter 12*; Edge Computing – *Class Notes*.