**Syllabus for CPSC 454 Cloud Computing & Security**

Department of Computer Science

California State University, Fullerton

**Course:** CPSC 454 -- Cloud Computing & Security

**Course Website:** Titanium

**Section 01**

Time: TuTh: 2:30PM - 3:45PM

Place: CS 110B - Lecture Room

**Section 02**

Time: TuTh: 4:00PM - 5:15PM

Place: CS 102A - Lecture Room

**Instructor:** Dr. Yun Tian

Email: [ytian@fullerton.edu](mailto:ytian@fullerton.edu%20)

Phone: (657) 278-2041 (office)

Office CS-544

Office Hours: Mon. & Wen.: 3:00 PM to 4:00 PM

Tu. & Th.: 2:00 PM to 2:30 pm

Or by appointment

**Credit Hours: 3**

**Prerequisite**

CPSC 333: Introductions to Computer Security

CPSC 351: Operating System

**Textbook**

Lecture presentations, handouts, and web resources will be provided. Course readings will be

drawn from research papers available online.

**Course Description**

This course is a tour through various topics and technologies related to Cloud Computing and Cloud

Security.

Cloud Computing is a large-scale distributed computing paradigm that is driven by economies of scale, in which a pool of abstracted, virtualized, dynamically-scalable, managed computing power, storage, platforms, and services are delivered on demand to external customers over the Internet. Governments, research institutes, and industry leaders are rushing to adopt Cloud Computing to solve their ever-increasing computing and storage problems arising in the internet age.

Cloud Security is an evolving sub-domain of [computer security](http://en.wikipedia.org/wiki/Computer_security), [network security](http://en.wikipedia.org/wiki/Network_security), and, more broadly, information security. It refers to a broad set of policies, technologies, and controls deployed to protect data, applications, and the associated infrastructure of [cloud computing](http://en.wikipedia.org/wiki/Cloud_computing). There are a number of security issues associated with cloud computing.

The extensive use of virtualization in implementing cloud infrastructure brings unique security concerns for customers or tenants of a public cloud service. Virtualization alters the relationship between the OS and underlying hardware. This introduces an additional layer - virtualization - that itself must be properly configured, managed and secured.

The lecture materials will focus on the cloud computing models and applications, virtualization technologies, and different cloud security techniques. Through course projects, students will learn project design, management, implementation, testing and reporting skills.

**Topics**

This course will help students acquire necessary knowledge about cloud computing, virtualization, and cloud security including:

* What is virtualization and Cloud computing and its history and evolution?
* Architecture and models that support cloud computing service frameworks.
* Resource (computing, storage, and network) virtualization
* Cloud computing infrastructure requirements and limitations
* Cloud Computing architecture and industry frameworks such as MapReduce (Hadoop)
* Practical applications (virtual lab and mobile cloud computing)
* Monitoring, management, and security protection of cloud computing
* Software networking and risk mitigation methodology for cloud computing.
* Vulnerabilities and risks of cloud computing
* Data classification and protection in cloud
* User identification and access control in cloud computing
* Open research issues in cloud computing and security
* Hands-on experience on cloud system establishment and building large-scale cloud computing applications

**Objectives**

The course is designed to introduce cloud computing and the related security techniques to CS curricula and provide students the fundamental background of cloud computing enabling technologies with hands-on experience. Student will

* learn the core concepts and principles of cloud computing and cloud security as well as identify and explore some of the emerging research challenges in cloud computing and cloud security;
* gain hands-on experience in using cloud computing infrastructure by designing, developing and deploying applications on cloud infrastructures; and
* work on a large research project in cloud computing and cloud security.

A semester-long project will be assigned to students using public cloud resources. Project topics will cover cloud virtual networking, service layers, service and user management, cloud-computing based applications, big-data analysis, security virtual networking for cloud computing, etc. Students will learn about the new programming paradigms that are developed for the cloud.

The course will firstly serve as a firm foundation on many cloud-computing principles and enablers such as distributed file systems and virtualization; secondly different cloud security techniques will be introduced and practiced. Students will be able to design and implement parallel algorithms to efficiently distribute data intensive computation over virtualized cloud platforms. As a result, students will have the foundation needed to match the future needs in the emerging field of cloud computing and the related cloud security techniques.

**Student Learning Goals**

The primary learning goals of the course is four-fold:

* Students will explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about and the influence of several enabling technologies in cloud computing.
* Students will study the main security issues, challenges and the related techniques of cloud computing.
* Students will examine the process of working on a large research project. They will study how applications for clouds are written, deployed and analyzed. In the process, they will develop the needed skills to go through project planning, design, implementation, analysis and reporting.
* Students will identify some of the emerging cloud computing and the related security challenges.

**Coursework and Grading**

* **Midterm Exam (20%).**
* **Final Exam (30%)**.
* **Term Project (30%):** There will be a group project (at most 4 students) on a selected topic in the areas: cloud resource management/monitoring, cloud computing for big data, and cloud security. More details on the project topics will be discussed in the first four weeks of the semester.
* **Survey Paper (20%):** There will be one survey paper assignment on the survey of a self-chosen cloud computing and cloud security technical areas. This survey paper also includes a part of your study summary. More details of the survey paper will be discussed in the first four weeks of the semester.
* **Course Organization**

Your participation in the course will involve several forms of activity:

* Attending and participating in the lectures and discussions
* Projects, Posters and Report Papers.
* Project and Poster Designs and Status Updates

**Attendance and participation:**

Attending the lectures is mandatory. Students are responsible for all course material regardless of whether they are present or absent. **Attendance will be recorded from time to time and students who are absent for 5 or more times will receive an “F” for this class.** If you must be absent on a day when submissions are due, you must make special arrangements to turn in your submission ahead of time. These arrangements must be made at least two business days ahead of the deadline.

**Extra Work— Graduate students**

In addition to the standard projects, graduate students will be required to write the survey paper in an IEEE format and with two more pages of contents. More details and resources will be provided about how to write your paper in the right format while the survey paper assignment is released.

**Exams**

**Two exams are given.** The first exam is given around the eighth or ninth week, and the second exam is given during the final's week (please check at <http://admissions.fullerton.edu/currentstudent/guides/F2016_FinalExams.pdf> )**.**  Make up exam is permitted, if the student calls me one week before the exam is given. If the exam is a take home exam, it must be turned in by the due date and due time.

**Final Exam Time:**

Section 01 Thursday, December 14, 2:30 - 4:20 pm @ CS 110B - Lecture Room

Section 02 Tuesday, December 12, 5:00 - 6:50 pm @ CS 102A - Lecture Room

**Collaboration**

Collaboration is not allowed on any exam. Partners may work together on group projects freely. I expect that each group will complete their own work themselves, with only limited help from other individuals or sources. The following guidelines apply to collaboration with any person or resource *other than your partner:*

*•* You may help each other understand the assignment and brainstorm general solutions, but each group must develop and submit their own distinct work.

*•* You may give each other technical support.

*•* You must separate to develop your own detailed solution to the problem, and type in your own source code and project report.

*•* You should be able to explain any part of your submission, and why you wrote what you did.

Given these requirements, any submissions with identical excerpts, or excerpts that are identical up to superficial rearrangements, will be considered highly suspect of plagiarism.

**Policies**

**Academic dishonesty**

It is your responsibility to be aware of and follow the spirit of CSU Fullertons academic honesty policy which can be found at <http://www.fullerton.edu/senate/documents/ups.asp>([300.021](http://www.fullerton.edu/senate/documents/PDF/300/UPS300-021.pdf)) Repeated failure to follow the spirit of the academic honesty policy will be reported to the Judicial Affairs office.

**Cheating**

Each project must be the sole work of the student turning it in, except for possible group

projects. Assignment sand project reports will be closely monitored by automatic cheat checkers, and students may be asked to explain any suspicious similarities with any piece of code or

articles available. The following are guidelines on what collaboration is authorized and what is not:

What is cheating?

* Sharing code or other electronic files: either by copying, retyping, looking at, or supplying a copy of a file.
* Sharing written assignments: Looking at, copying, or supplying an assignment.

What is NOT cheating?

* Clarifying ambiguities or vague points in class handouts.
* Cited statements
* Helping others use the computer systems, networks, compilers, debuggers, profilers, or other system facilities.
* Helping others with high-level design issues.
* Helping others debug their code.

Cheating in group projects will also be strictly monitored and penalized (similar to cheating in individual exams, assignments or projects). Be aware of what constitutes cheating (and what does not) while interacting with students in other groups; same rules of cheating as above apply when collaborating between two or more groups. You cannot share or use written assignments, code, and other electronic files from students in other groups.

Be sure to store your work in protected directories. The penalty for cheating is severe, and might jeopardize your career; cheating is not worth the trouble. By cheating in the course, you are cheating yourself; the worst outcome of cheating is missing an opportunity to learn. In addition, you will be removed from the course with a failing grade.

**ADA Accommodations**

Any student who, because of a disability, may require special arrangements in order to meet course requirements must contact the instructor and the Office of Disability Support Services as soon as possible to make the necessary arrangements. The instructor may request verification of need from the Dean of Students Office. Students are encouraged to contact the Office of Disability Support Services within the first week of the semester to best ensure that the appropriate accommodations are implemented in a timely fashion. The Office of Disability Support Services website is [http://www.fullerton.edu/DSS/.](http://www.fullerton.edu/DSS/) They can be reached by phone at 657-278-3117 or TDD at 657-278-2786.

**Administrative drops**

According to department policy, any student who misses the first class meeting, and does not contact the Department office to hold their seat may be dropped from the class.

**Attendance**

Attending the lectures is considered mandatory. Students are responsible for all course material regardless of whether they are present or absent. If you must be absent on a day when submissions are due, you must make special arrangements to turn in your submission ahead of time. These arrangements must be made at least two business days ahead of the deadline.

**Email**

You have a CSUF-supplied email account, and that is the only way I have of reaching you outside class. Check that account frequently for important class announcements and individual messages.

**Emergency procedures**

For your own safety and the safety of others, each student is expected to read and understand the guidelines published at <http://prepare.fullerton.edu/>. Should an emergency occur, follow the instructions given to you by faculty, staff, and public safety officials. An emergency information recording is available by dialing 657-519-0911.

**Extra credit**

Extra credit is not available. Please do not ask for extra credit.

**Grade exceptions**

Too often I am approached at the end of the term by students telling me how desperate they are to get a passing grade because they’re graduating or on academic probation. In these cases, there’s nothing that can be done. If this class is important to you and there is a lot riding on your grade, it is your burden to work hard, come get help when necessary, attend class, complete all the projects, and do well on exams. Your obligation begins on day one. Please note that there is one syllabus for the course; all students are graded based on the requirements outlined in the syllabus, and nothing more. There are no special deals, relaxed standards or extra opportunities based on class standing or other factors. Your grade is a function of your graded work, and that alone. That’s an essential part of a fair grading system.

If you are surprised by your grade at the end of the semester, you have the right to ask if the grade was given in error. I am happy to check your scores to verify that no clerical error was made; these errors are extremely rare, but possible. In the exceptional circumstance of a clerical error, it will be corrected promptly. Note that final course grades are non-negotiable, and University policy establishes that grades are given at the sole discretion of the faculty member. If your grade was not given in error, that is your final, non-negotiable grade.

**Grade records**

I record assignment and project grades in the TITANium grade book facility. You can view the scores that I’ve recorded at any time through TITANium.

**Late submissions**

Late submissions shall be penalized 10%. No assignment shall be accepted after 24 hours from the deadline.

**Letter grade system**

At the end of the term, I will convert each student’s weighted numerical average into a plus/minus letter grade. By default I will use the standard TITANium grade scale:

|  |  |  |
| --- | --- | --- |
| **Highest (%)** | **Lowest (%)** | **Letter** |
| 100.00 | 93.00 | A |
| 92.99 | 90.00 | A- |
| 89.99 | 87.00 | B+ |
| 86.99 | 83.00 | B |
| 82.99 | 80.00 | B- |
| 79.99 | 77.00 | C+ |
| 76.99 | 73.00 | C |
| 72.99 | 70.00 | C- |
| 69.99 | 67.00 | D+ |
| 66.99 | 60.00 | D |
| 59.99 | 0.00 | F |

I reserve the right to *decrease these boundaries*, but will *not increase* them. In other words, I have leeway to adjust the boundaries downward, awarding higher letter grades, to compensate for assignments that were more difficult than expected. In general I will not adjust grade boundaries unless the unadjusted class average is significantly lower than the departmental GPA average.