

EE 542 : Internet and Cloud Computing, Fall 2016 (updated April 6, 2016)

Class Website: <http://blackboard.usc.edu> for both sections unified.

Class Sec. 31119: MW 10 – 11:15 am, MHP 105; **Section 30535 :** MW 2 – 3:15 pm, MHP 105

Instructor: Kai Hwang, Professor of Electrical Engineering and Computer Science,

Office Hours: M.W. 8:20 – 9:50 am and 12:20 – 1:50 pm. in my office **EEB 212**

Email: kaihwang@usc.edu, Tel.: 213-740-4470 (just for emergency contact or leave short voice message)

Teaching Assistants: Yue Shi, yueshi@usc.edu for AM section; Fenxiao Chen, fenxiaoc@usc.edu for PM section
(TA office in EEB 224, but their consulting rooms for this class are yet to be announced)

Catalogue Description: Principles and technologies of server clusters, virtualized datacenters, Internet clouds, Grids/P2P Systems, social networks, Internet of Things (IoT), and applications

Recommended Background: (Not prerequisite) EE 457 or EE 450 recommended or consent by instructor.

Required Textbooks: (1) K. Hwang, G. Fox and J. Dongarra, *Distributed and Cloud Computing*, Morgan Kaufmann Publisher, 2012. (ISBN 978-0-12-385880-1).
(2) B. Baesens, *Analytics in a Big Data World*, Wiley, 2014, (ISBN:978-1-118-89270-1).

Course Description:

This course is designed for graduate students in electrical engineering and computer science. Students will learn the theory, architecture, hardware/software, and programming of computing clouds, Internet of Things (IoT). machine learning, and big data analytics.. Students will have the opportunity to gain hands-on experience in using Amazon cloud (AWS), where real-life cloud, big data or IoT applications will be developed and executed on Amazon EC2 and S3, etc. For cloud platforms and supporting software, we will cover the AWS, GAE, Salesforce, Azure, iCloud, DropBox, Facebook, MapReduce, Hadoop, Spark, Eucalyptus, vSphere, OpenStack, XEN, Docker, VMWare Tools, etc. .

Syllabus and Weekly Lecture Contents: (updated April 6, 2016)

| Lectures and Dates in 2016 | Topics Covered, Source, Due Dates and Exams |
|-------------------------------|---|
| Lec.1 / 2 , Aug. 22, 24 | Course Introduction, Basics of Clouds, IoT and Big Data, Chapter 1 |
| Lec 3 / 4 , Aug. 29, 31 | Large-Scale Server Clusters and AWS Cloud Architecture, Chapters 2 and 4 |
| Lec.5 / 6 / 7 Sept. 7, 12, 14 | Virtual Machines and Docker Containers, Chap.3 plus new material, (No class on Sept.5) |
| Lec. 8 / 9 , Sept. 19, 21 | Cloud Project Specification , (Proposal due Oct.3) . HW#1 due Sept. 21 |
| Lec. 10 / 11 , Sept. 26, 28 | MapReduce and Hadoop Programming (Chap.6) |
| Lec. 12 / 13 , Oct. 3, 5 | Spark Programming, Cloud OS, and Public Clouds (New Material, Handout paper) |
| Lec. 14 , Oct. 10 | Cloud Benchmark Performance (Handout Paper) , HW#2 due Oct 10 |
| Lec. 15 , Oct. 12 | Review Session for Mid-Term Exam. |
| Mid-Term Exam, Oct.17 | 10 am – 11: 20 pm, (80 minutes), MHP 15 plus another room to be announced |
| Lec.16 , Oct. 19, | Introduction to Data Science (Baesen's Book), HW#3 assigned , no submission |
| Lec. 17 / 18 , Oct. 24, 26 | Machine Learning Techniques and Software Tools |
| Lec. 19 / 20 , Oct.31, Nov.2 | Big Data Analytics, handout HW #3, no need to turn in for grading |
| Lec. 21 / 22 , Nov. 7, 9 | Grids and P2P Overlays and Social Networks, Chapters 7, 8 and 9 |
| Lec. 23 / 24 , Nov.14, 16 | Internet of Things, Sensing Technologies, Chap.9, Project Report due Nov. 23 |
| Lec. 25 / 26 , Nov. 21, 28 | Hype Cycle and SMACT Technologies, (handout Solutions for HW#3, no class on Nov. 23) |
| Lec. 27 , Nov. 30 | Conclusions of The Course and Review for Final Exam |
| Final Exam (2 hours) | Dec.7-14, 2016 , the exact date, time and venue will be announced once confirmed |

Grading Policy and Class Rules: The course work is evaluated by 4 performance metrics in 15 weeks:

- All exams are close-book/ close-notes. No make-up exam. Students from both sections must take the same mid-term and the same final exams at the same time on the same day. Go to TAs for all questions on homeworks and grade recording.
- **Homework Sets (10 %):** 3 Homework Sets to be done individually. Only HW#1/2 are graded. Solutions to all HW #3 will be provided. Submit home work at the class beginning on the due days (**Sept.21, Oct.10**). No late homework will be accepted.
- **Mid-Term Exam (30 %):** **Oct.17, 2015**, Time/place to be announced , covering the first 15 lectures & HW#1 and 2
- **Term Project (20 %):** AWS cloud experiments with the **Project Reports due Nov. 18, 2016**. Late report will not be accepted. Term Projects are done in team of 3 students each. Each team must elect a leader who coordinates the group effort and communicates with the TAs and instructor. All Email exchanges must copy to all team members, transparently.
- **Final Exam (40 %):** Dec.7 – 14, 2016, covering all lectures plus the AWS Project & all HW sets. No negotiation for grade after the exams. You have to work hard to earn a decent grade.