# EE 542 : Internet and Cloud Computing, Fall 2016 (updated August 18, 2016)

## Class Website: http://**blackboard.usc**.edu *for* both sections unified.

**Sec. 31119R: MW 10 – 11:15 am, Sec.30535R : MW 2 – 3:15 pm, Class Room: SOS (Social Science Bldg.) B4**

**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 Assistant: Yue Shi, yueshi@usc,edu , Office Hours: Tu. 10-11:30 am, Wed. 4-5:30 pm PHE 320**

**Course Description**: Cloud computing, principles, systems architecture , big data science and cognitive computing, virtualization, inter-cloud mashups, Internet of Things, machine learning, MapReduce, Hadoop, Spark and TensorFlow programming 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)** K. Hwang : *Cloud and Cognitive Computing: Principles, Architecture, Programming*,
   (in press to appear 2017). (Partial Text to be handed out to registered students in class).

**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, big data analytics, cognitive computing and brain-inspired future computers.. 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. We will cover the AWS, GAE, Salesforce, Azure, iCloud, Facebook, MapReduce, Hadoop, Spark, Eucalyptus, vSphere, OpenStack, XEN, Docker, VMWare Tools, etc. .

**Syllabus and Weekly Lecture Contents:** (updated August 4, 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 ~5, Aug. 29/ 31, Sept. 7 | Server Clusters , Cloud Architecture, Chapters 2 and 4 plus handout material |
| Lec.6 / 7, Sept. 12, 14 | Virtual Machines and Docker Containers, Chap.3 plus handout material, (No class on Sept.5) |
| Lec. 8, Sept. 19, 2016 | **Cloud Project Specification, (**Team Proposal due Oct.3 **). HW#1 due Sept. 19** |
| Lec. 9 ~ 11, Sept. 21, 26, 28 | MapReduce, Hadoop and Spark Programming (Chap.6 plus handout ) |
| Lec. 12/13, Oct. 3, 5, | Spark Programming, Cloud OS and OpenStack, vSphere ( New Material, Handout in class) |
| Lec. 14/15, Oct. 10, 12 | Cloud Performance and IoT Interactions (Handout Paper) **, HW#2 due Oct 10** |
| Lec. 16, Oct. 17, 2016 | Review Session of the first 15 lectures on Oct.17 for Mid-Term Exam. |
| **Mid-Term Exam, Oct. 19** | **10 am – 11: 20 pm, (80 minutes), SOS B4** for AM students and another room ( TBA) for PM students, both sectionshold the exam at the same time. |
| Lec.17, Oct. 24, 2016 | Introduction to Data Science and Analytics (Handot material) |
| Lec. 18/19, Oct. 26, 31 | Machine Learning Techniques, Google TensorFlow , Lab X, DeepMind Programs |
| Lec. 20, Nov.2, 2016 | Big Data Analytics and Software Tools ( handout material) |
| Lec. 21 / 22, Nov. 7, 9 | AI, VR, Robotics, and Neurocomputer Chips and Systems (Handout). **HW#3 due Nov.9.** |
| Lec. 23 / 24, Nov.14, 16 | Mobile Cloud s and Mashups , Chap.9 plus handout, **Project Report due Nov. 21** |
| Lec. 25 / 26, Nov. 21, 28 | SMACT Technologies and Neurocomputers, (handout and no class on Nov. 23) |
| Lec. 27, Nov.30, 2016 | Conclusions of The Course and Review of entire course for the Final Exam |
| **Final Exam (2 hours)** | **2 – 4 pm, Dec. 9, (Friday).** The exact date/venue yet to be announced for all students. |

**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 for any excuses. Students from both sections must take the same mid-term and final exams at the same time on the same day. Go to the TA for all questions on homeworks and grade recording problems..

▪ **Homework Sets (15 %):** 3 Homework Sets to be done individually. Solutions to all HW sets will be provided. Submit home work at the class beginning on the due days (**Sept.19, Oct.10, Nov.9**). No late homework will be accepted.

▪ **Mid-Term Exam (30 %): Oct.19, 2016,** Time/place to be announced , covering the first 15 lectures & HW#1 and 2 (for both sections)

▪ **Cloud Programming Project (15 %):** AWS cloud experiments with the Project Reports due **Nov. 21, 2016**. Late report will not be accepted. Term Projects are done in teams of 3 students each. Each team must elect a leader and submit one Report only.

▪ **Final Exam (40 %): Dec. 9, 2016 (yet to be confirmed),** covering all lectures plus the AWS Project, and all HW sets. All students must attend at the same time. No negotiation of grade after the exams. You have to work hard to earn a decent grade.