CS 425 Distributed Systems, Fall 2015, University of Illinois at Urbana-Champaign

Course Information

§ Course Overview (or – What Will I Learn from this Course?)

This course will equip students with foundational basics needed to understand, work with, and build distributed systems such as cloud computing systems. Topics include, but are not limited to, MapReduce, distributed hash tables (peer-to-peer systems), failure detectors, synchronization, election, distributed agreement, inter-process communication, consensus, gossiping, concurrency control, replication, key-value stores, NoSQL, security, probabilistic protocols, self-stabilization, measurements, etc. These topics are discussed in the context of real-life and deployed systems such as clouds and datacenters, databases, peer to peer systems, clusters, etc. This course does not deal with details of computer networking and routing and wireless/mobile computing – other courses in the department (e.g., CS 438/439) cover those.

§ Course Essentials

Lecture: Tuesday and Thursday, 2:00 PM - 3:15 PM, 1320 DCL (Digital Computer Laboratory).

Course Website: `http://courses.engr.illinois.edu/cs425/`

All lectures and some announcements will be posted on this forum, so please check periodically.

Discussion Forum: We will be using Piazza (link is on the website). Important announcements will be posted on this forum, so please check periodically. This is your go-to place to ask clarification questions for HWs and MPs. Before you post, check if someone has already asked that question.

The course staff will attempt to ensure your questions are answered within 24-48 hours of it being posted. This does not mean you should post questions at the last minute, e.g., before a deadline.

Prerequisites: CS 241 (Systems Programming) or ECE 391, or equivalent course on Operating Systems or Networking (approval of instructor required for latter).

Credits: 3 - 4 hours.

Main Textbook (Recommended, not Required): Coulouris, G., Dollimore, J., Kindberg, T., and Blair, G., *Distributed Systems: Concepts and Design*, Addison-Wesley, *Fifth Edition, 2011, ISBN: 0132143011*. [Recommended purchase – copies available at Illini Book Store. On reserve at Grainger Library]. *We will refer to chapter, section, and problem numbers ONLY in the Fifth Edition. If you use an older edition, correct interpretation/translation of these numbers is solely the students' responsibility (no excuses).*

Supplementary material are listed at the end of this handout.

Course Staff Contact Information and Office Hours: Please see course website.

§ Course Participation

Assignments:

1. There will be four to five homework sets (HWs) , with about 1-2 weeks turnaround time per homework. **Your homework solution submissions are required to be typed** (you may use any of your favorite word processors). We will not accept handwritten solutions. Figures and equations (if any) may be drawn by hand. Homeworks will be **due at the beginning of class on the day of the deadline**.
2. Three to four programming assignments (MPs) will be given throughout the semester, each requiring 2-4 weeks of effort.
3. Start your HWs and MPs early. DO NOT start at the last minute – these assignments involve more time than you think. If you start the HW/MP the day before the deadline, you're already too late.

Grading (tentative splits):

- Homework sets (HWs) 30% (For both 3 credit and 4 credit students)
- Programming Assignments (MPs) 20% **(Only for 4 credit students)**
- Midterm Exam 15% (For both 3 credit and 4 credit students)
- Final Exam 35% (For both 3 credit and 4 credit students)

Grades will be available in Compass 2g.

Grading for undergraduate and graduate students will be separated. Grades will be assigned on a curve (relative grading). The fraction of students receiving A's is not fixed a priori, and depends on the overall class performance.

3 credit vs 4 credit Students: The MPs are only for 4 credit students. We will be grading and evaluating only MPs submitted by 4 credit students. We will not be grading or giving extra credit to MPs by 3 credit students. If you're a 3 credit student and wish to do the MPs, please upgrade yourself to 4 credits.

MP Groups: MPs must be done only in **groups of 2**. Groups of size 1, 3 (or more), or zero are not accepted. Here's your chance to practice pair programming! Please read the "Academic Integrity Policy" on the next page of this document.

HW Groups: There are no HW groups. All HWs must be done individually. You cannot discuss solutions or ideas with anyone else other than course staff (but you can discuss lecture concepts and the

HW question itself). Please read the "Academic Integrity Policy" on the next page of this document.

Lecture Participation: Attending the lectures is important. Some lectures may have a quiz or in-class homework solving (included in your grade) - if you miss the class, you've lost the points.

§ Course Policies

Academic Integrity Policy We adhere by the CS academic integrity policies outlined at the webpage https://wiki.cites.illinois.edu/wiki/display/undergradProg/Honor+Code. It is the course policy that all of the work you submit for grading, or in support of graded material, as an individual or project group, shall be your own product, from inception to completion. The only resources you can avail of in your HWs and MPs are the provided course materials (slides, textbooks, etc.), and communication with instructor/TA via newsgroup and email. Please do not reveal solutions on any of these fora. Exams are closed-book, closed-notes, unless otherwise specified.

All homeworks are individual. Other than with course staff, you should discuss, or share, or work together on, **solutions** with **no one else** (whether in the class or outside). You can however discuss with other students **lecture concepts** or **the HW question itself** (but not the solution).

For MP groups, other than with the course staff, you can discuss, share the **solution** (or ideas or code or whatever), or work together on, the MP, **only with your group partners**. You cannot discuss, work on, or share, the MP solution with anyone else. You can however discuss with other students **lecture concepts** or **the MP spec itself** (but not the solution).

Please use the discussion forum for questions/discussion on HWs and MPs - however, if you post a solution (code or write-up) to the forum, you will lose all points for that particular assignment. Email the staff only when you cannot use the discussion forum, e.g., if you have an urgent question, or if you have a personal matter to ask/discuss.

Result of Cheating Violations of this academic integrity policy will be treated seriously. A first violation of these academic integrity guidelines will result in a zero grade on that HW/MP. A second violation will result in an F grade for the entire course. (And yes, in the past, we have caught almost all cheating students. And these cheating students have suffered both above types of consequences, and worse.)

Just don't cheat – your time is not worth it. If you cheat in this course and get away with it miraculously, later in life, when you are working in a job and need to use these concepts, you will be at a loss (Karma comes around).

Policy on Late Submission: Unless otherwise specified, **all MP assignments**, or components thereof, that are to be electronically submitted are **due at 11:59 PM** on the due date. Similarly, **homework sets**, or components thereof, that must be submitted by other means are **due at the beginning of class** on the due date.

All MP and HW submission deadlines are hard and will not be extended. No late homework sets or MPs will be accepted except under extremely rare non-academic circumstances (which usually require approval from the Dean's office).

§ Supplementary Textbooks

We will use many readings off the Web - these will be available under the Lectures link on the course website. The following textbooks may be used for supplementary course material. You are not required to own these books. They are on reserve at the Grainger Library (if available). You *may* be able to use a prior edition of the textbook if you own one.

1. Fourth edition of the Coulouris-Dollimore-Kindberg textbook.
2. "Distributed Systems: An Algorithmic Approach," Sukumar Ghosh, CRC Press, 2006, ISBN: 1584885645. (Available online free at the Illinois Library Catalog).
3. "Distributed systems: principles and paradigms," A. Tanenbaum and M. Steen, Prentice Hall, Second Edition, 2005, ISBN: 0132392275.
4. "Distributed algorithms: concepts and design," N. Lynch, Morgan-Kaufmann, 1ed, 1996, ISBN: 1558603484.