

# **Course Syllabus**

## **CSE 512: Distributed and Parallel Database Systems**

**Semester:** Fall 2021

**Number of Credits:** 3

**Day/Time:** Monday / Wednesday 1:30 – 2:45 pm

**Location:** Tempe

### **Instructor Information:**

**Name:** Mohamed Sarwat

**Email:** msarwat@asu.edu

### **TA Information:**

**Name:** Kanchan Chowdhury

### **Instructor Office Hours:**

**Data/Time:** Monday/Wednesday 3:00 – 4:00 pm

**Location:** Zoom Personal Meeting Room

### **ASU Synch / Zoom meeting:**

This course uses Sync. ASU Sync is a technology-enhanced approach, designed to meet the dynamic needs of the class. During Sync classes, students learn remotely through live class lectures, discussions, study groups and/or tutoring. You can find out more information about ASU Sync for students here, <https://provost.asu.edu/sync/students>

### **Course Prerequisites:**

For the course to be effective, course participants should already have acquired basic database systems knowledge (e.g., took CSE 412 and/or CSE 510) including: SQL query language, Query Processing and Optimization, Data Storage and Indexing, Transaction Management. Course participants should also have programming experience with a high level programming language (e.g., C++, Java) and/or scripting languages (e.g., Python).

### **Course Description:**

This course touches upon the following main topics: distributed database architectures, distributed data storage and indexing, distributed and parallel query processing/optimization, Concurrency control in distributed Parallel Database Systems, Data Management in Cloud Computing Environments, Data Management in Map/Reduce-based Systems, and Distributed NoSQL Database Systems. Note that the teaching style in this course is not only lecture-based. Students need to do the necessary reading before class and come prepared to participate in in-class discussions.

### **Course Reading:**

- During the course, we will cover several chapters in the following textbook: “Principles of Distributed Database Systems” by Ozsu, Valduriez.
- When needed, recommended books and/or research articles are cited at the beginning of each course section.

### **Course Schedule:**

Week	Topic	Due	Feedback	Reading
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Week 1	Database systems Review / Distributed Systems Principles			TBA
Week 2	Data Fragmentation & Replication			TBA
Week 3	Distributed Query Processing & Optimization	Assignment 1		TBA
Week 4	Parallel Query Processing		Assignment 1	TBA
Week 5	Data Management in Map-Reduce Systems			TBA
Week 6	Distributed Transaction & Concurrency Control	Assignment 2		TBA
Week 7	Replicated Data Management		Assignment 2	TBA
Week 8	Distributed Database Reliability & Fault Tolerance	Assignment 3		TBA
Week 9			Assignment 3	TBA
Week 9 – Midterm Exam ()				
Week 10	Big Data Systems	Assignment 4		TBA
Week 11	Data Management in Cloud Computing Environments		Mid-Term	TBA
Week 12	Data Management in Blockchain Systems		Assignment 4	TBA
Week 13	Distributed No- SQL Database Systems	Assignment 5		TBA
Week 14			Assignment 5	TBA
Week 14 – Final Exam ()				

### Assignments:

There will be five assignments that constitute 50% of the total grade. All assignments should be submitted to the class website (via canvas). The exact date for turning in (and receiving feedback on) each assignment is specified in the course schedule.

## Grading Criteria:

Assignments	50%
Mid-term Exam	25%
Final Exam	25%

The final grade will be based solely on the absolute percentage. There are three necessary (minimum) conditions for passing this class: (1) Submission of **ALL** assignments and (2) Attempting both exams. A grade of Incomplete may be given under special circumstances and requires both the instructor and the student to complete a contract with a plan for completing the course work. Grade distribution is as follows:

- A+: Grade  $\geq 99\%$
- A:  $99\% > \text{Grade} \geq 96\%$
- A-:  $96\% > \text{Grade} \geq 91\%$
- B+:  $91\% > \text{Grade} \geq 87\%$
- B:  $87\% > \text{Grade} \geq 80\%$
- B-:  $80\% > \text{Grade} \geq 76\%$
- C+:  $76\% > \text{Grade} \geq 73\%$
- C:  $73\% > \text{Grade} \geq 70\%$
- D:  $70\% > \text{Grade} \geq 60\%$
- E:  $< 60\%$

## Student Role (Minimum requirements to pass this class):

- Actively participate in class and engage in class activities.
- Turn in all assignments on time (no late assignments will be accepted).

## Instructor Role:

- Facilitate discussions among all course participants during the class session.
- Provide detailed feedback on exams and all submitted assignments.
- Respond to students' inquiries about the course material and assignments.

## Course Policies – Assignments and Grading:

**Attendance and Participation:** It is **highly recommended that you attend each class session. When you attend**, please arrive on time, attend the full class period, and participate in the class activities. It is totally fine that participants (students) may need to occasionally miss a class session for personal reasons (e.g., religious holiday, family matter). In these situations, the student shall contact the instructor to discuss alternative ways to grasp the information presented in the missed class session.

**Late Submission Policy:** The due dates/times for all assignments are presented above on the class schedule. Please note the dates/times carefully because there will be no provision for late submissions, except for extraordinary circumstances. Late submissions will receive no credit since I post the model answer online right after the submission date.

**Makeup Exam Policy:** There will be no provision for make-up exams or assignments, except in extraordinary and documented circumstances.

## Course Policies – Ethics and Conduct:

**Accommodations for Students with Disabilities:** Suitable accommodations will be made for students having disabilities. Students needing accommodations must register with the ASU Disabilities Resource Center and provide documentation of that registration to the instructor. Students should communicate the

need for an accommodation in sufficient time for it to be properly arranged. See [ACD 304-08 Classroom and Testing Accommodations for Students with Disabilities](#).

**Student Diversity:** This class embraces Arizona State University's position that promoting and supporting diversity among students is central to the academic mission of the University. At the core of our mission is to foster an environment in which students may think, learn and excel without prejudice, and where all recognizes personal dignity and respect for the individual.

**Student Conduct:** In the unfortunate event that participant behavior disrupts class or endangers participants, the instructor has the responsibility to ask that participant to moderate behaviors, and also has the right to ask uncooperative students to leave a class session. Students whose behavior suggests the need for counseling or other assistance may be referred to their college office or University Counseling and Consulting Services. Students whose behavior may violate the University Student Conduct Code may be referred to the Office of Student Conduct and Academic Integrity (<https://eoss.asu.edu/dos/srr/codeofconduct>). Every attempt will be made to deal with any conflicts in the most timely, direct, educative, and respectful manner.

**Academic Integrity:** Students in this class must adhere to ASU's academic integrity policy, which can be found at <https://provost.asu.edu/academic-integrity/policy>). Students are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. In addition, all engineering students are expected to adhere to both the ASU Academic Integrity [Honor Code](#) and the Fulton Schools of Engineering [Honor Code](#). All academic integrity violations will be reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). The AIO maintains record of all violations and has access to academic integrity violations committed in all other ASU college/schools.

Students are expected to do their own assigned work. If it is determined that a student has engaged in any form of academic dishonesty, he or she may be given an "F" for the course, and may face additional sanctions from the University. See <https://provost.asu.edu/files/AcademicIntegrityPolicyPDF.pdf>.

**Contacting the Instructor:** The best form of contact for me is by e-mail. I will make every effort to reply to your e-mail within 24 hours during the week and within 48 hours on the weekend. In your e-mail correspondence, please include [CSE 512] and the topic of the e-mail in the subject line.

**Course Feedback:** My goal is to create an environment that maximizes your learning. Your feedback is critical to meeting this goal. To that end, I will elicit and welcome feedback from you about this course throughout the semester.

**Classroom Conduct/Civility:** The Arizona State University Student Conduct Code governs all activities in the University, including this course. Students who engage in behavior that disrupts the learning environment for others may be subject to disciplinary action under the Code. In addition, students responsible for such behavior may be asked to cancel their registration (or have their registration cancelled).

**Copyright:** All course content and materials, including lectures (Zoom recorded lectures included), are copyrighted materials and students may not share outside the class, upload to online websites not approved by the instructor, sell, or distribute course content or notes taken during the conduct of the course (see [ACD 304-06](#), "Commercial Note Taking Services" and ABOR Policy [5-308 F.14](#) for more information).

You must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

**Harassment and Sexual Discrimination:** Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of

the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at

<https://sexualviolenceprevention.asu.edu/faqs>

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, <https://eoss.asu.edu/counseling>, is available if you wish discuss any concerns confidentially and privately.