

Course Outline

1. Document Information

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|---------------------------|----------------------------|
| Degree Program | Computer Science |
| Course Number | CS 530 |
| Course Title | Advanced Data Base Systems |
| Semester Hours | 3 |
| Course Coordinator | Dunren Che |
| Revision Term | Fall 2020 |
| Latest Revision | Spring 2021 |

2. Catalog Description

A detailed treatment of advanced topics in database systems, including but not limited or restricted to, relational database theory, query optimization, recovery techniques, concurrency control, distributed database systems, security and integrity, and database machines.

3. Textbooks

- Garcia-Molina, H. (2009). Database Systems the Complete Book. 2nd Edition. ISBN: 9780131873254.

4. References

5. Course Learning Outcomes

- To develop a theoretical understanding of the relational model.
- To prepare for possible research in some advanced topics in database systems.

6. Assessment of the Contribution to Student Outcomes

| Outcome | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------|---|---|---|---|---|---|---|
| Assessed | X | X | | | X | | X |

7. Prerequisites by Topic

CS 430.

8. Major Topics Covered in the Course

- Design Theory for Relational Database Systems
Normalization, Functional and Multivalued Dependencies (review and complete the discussion started in CS 430) {8 classes}
- Query Optimization
Query Processing Cost, Access Cost, Join Strategies {5 classes}
- Crash and Failure Recovery Techniques
Log-based Schemes, Checkpoints, Shadow Paging {3 classes}
- Concurrent Operations in Databases
Serializability, Locking, Timestamping, Deadlock Handling {7 classes}
- Distributed Database Systems
Centralized vs. Distributed Trade-offs, Query Processing, Recovery, Concurrency Control, Deadlock handling {7 classes}
- Database Security and Integrity
Types of Violations, Authorizations, Constraints, Encryption, Statistical Inference {4 classes}
- Database Machines
Approaches, Examples {4 classes}
- New Applications
Knowledge Bases, CAD/CAM Databases {2 classes}