<table>
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<tr>
<th>Dept Number</th>
<th>CS 530</th>
<th>Course Title</th>
<th>Advanced Data Base Systems</th>
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<tr>
<td>Semester Hours</td>
<td>3</td>
<td>Course Coordinator</td>
<td>Wen-Chi Hou</td>
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<tr>
<td>Catalog Description</td>
<td>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.</td>
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**Textbooks**

**References**

**Course Learning Outcomes**

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

**Assessment of the Contribution to Program Outcomes**

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<th>Outcome</th>
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<th>2</th>
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<td>Assessed</td>
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**Prerequisites by Topic**

CS 430.

**CS 530**

Advanced Data Base Systems

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Major Topics Covered in the Course
1. Design Theory for Relational Database Systems
   Normalization, Functional and Multivalued Dependencies (review and complete the discussion started in CS 430) {8 classes}

2. Query Optimization
   Query Processing Cost, Access Cost, Join Strategies {5 classes}

3. Crash and Failure Recovery Techniques
   Log-based Schemes, Checkpoints, Shadow Paging {3 classes}

4. Concurrent Operations in Databases
   Serializability, Locking, Timestamping, Deadlock Handling {7 classes}

5. Distributed Database Systems
   Centralized vs. Distributed Trade-offs, Query Processing, Recovery, Concurrency Control, Deadlock handling {7 classes}

6. Database Security and Integrity
   Types of Violations, Authorizations, Constraints, Encryption, Statistical Inference {4 classes}

7. Database Machines
   Approaches, Examples {4 classes}

8. New Applications
   Knowledge Bases, CAD/CAM Databases {2 classes}