A study of principles of database management systems. A thorough analysis of theory of normal, relational algebra and calculus and query languages based on these concepts. Other topics: security and integrity issues, concurrency control, distributed systems, query optimization. Prerequisites: General prerequisite; LE/EECS 2030 3.00 or LE/EECS 1030 3.00; LE/EECS 2011 3.00; LE/EECS 2021 4.00, LE/EECS 2031 3.00, LE/EECS 3421 3.00. Course credit exclusions: LE/CSE 4411 3.00, AK/AS/SC/CSE 4411 3.00. (NOTE: The General Prerequisite is a cumulative GPA of 4.50 or better over all major EECS courses. EECS courses with the second digit "5" are not major courses.)

### Instructor(s)

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<th>Name</th>
<th>Section / Format / Term</th>
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<tr>
<td>Gryz, Jarek</td>
<td>Sec. M / LECT / W</td>
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### Topics and Concepts

**Course Objectives and Content**

In this course, we go "under the hood" to learn how a relational database management system is built. Students will learn the issues involved in designing efficient database systems, and the strategies, data-structures, and algorithms used in the implementation of such systems.

The course is designed in three parts: the physical database, the query processor, and database management. Specific contents include the following.

**I. The Physical Database**

a. File organizations

b. Indexes
   - Tree-structured indexes
   - Hash-based indexes

c. External sorting

**II. The Query Processor**

a. Evaluation of relational operators
   - Selection
   - Projection
   - Joins (the many ways)
   - Set operations
   - Aggregate operations

b. Relational query optimization
   - Query evaluation plans
   - Translating SQL queries into algebra
   - Considering alternative plans
• Cost models and estimations

III. Database Management
a. Transaction management
b. Concurrency control
c. Crash recovery
d. Physical database design and tuning

REQUIRED TEXTBOOK/READING

GRADING SCHEME
Projects (3 x 10%): 30%
Test 1: 20%
Test 2: 20%
Final Exam: 30%

ADDITIONAL INFORMATION

ACADEMIC INTEGRITY LINKS
• Senate Policy on Academic Honesty - http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/
• Academic Integrity - http://lassonde.yorku.ca/academic-integrity

STUDENT LINKS
• Student Rights and Responsibilities - http://oscr.students.uit.yorku.ca/student-conduct
• Religious Observance - https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs
• Academic Accommodation for Students with Disabilities - http://secretariat-policies.info.yorku.ca/policies/academic-accommodation-for-students-with-disabilities-policy/
• Counselling and Disability Services - http://cds.info.yorku.ca/

Many courses utilize Moodle, York University’s course website system. If your course is using Moodle, click here to access it.
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