

Institute of Communication, Culture and Information Technology

Institute Office: Room 3014, CCT Building
Telephone: 905-569-4398

Course Outline Special Topics in CCIT: Databases

Course Code: CCT395H5F

Pre-requisites: 8.0 credits. Students should be familiar with basic HTML before taking this class.

Course Section:

Semester Offered: Fall 2010 (20109)

Course Meeting Time: Wednesdays, noon – 2 pm.

Course Location: CC2130

Credit Value: 0.5

Instructor

Professor: Yuri Takhteyev

Contact Information: yuri.takhteyev@utoronto.ca
415-946-3809 (week days except for Wednesday)

Office Hours: 2-3 pm on Wednesdays and by appointment, in CCT3018

Website: <http://takhteyev.org/courses/10F/cct395/>

Teaching assistant's name and contact information will be announced later.

Course Description

The course will introduce the students to database technologies, paying specific attention to analysis, design and use of relational database systems and SQL, but also looking more broadly at the different database technologies in use today.

Goals and Learning Objectives

Students will learn the main principles behind relational databases and information storage systems more broadly. In particular, they will acquire the following skills:

- analysis of domain and user requirements
- database design in the form of E-R diagrams
- implementing a database through SQL
- database queries
- implementing a web interface to a database using PHP

Course Requirements

Students are expected to come to class every week and to dedicate their full undivided attention to the content of the course while in the classroom. Students are encouraged to take notes, but should do so on paper, since the use of laptops will be limited in class. Students are strongly encouraged to have done all the required readings *before* the class and to come to class ready to ask questions about those readings.

Students are expected to submit their assignments on time, adhering strictly to required specifications.

Teaching Methods

The class will be taught in the form of lectures, which will explain and expand on the material presented in the readings and will include live demonstrations of how to use database software. Assignments will generally stress practical skills.

Required Materials

Two books are required. Both are available in the book store and the students are encouraged to buy their paper copies. However, the University of Toronto library also provides access to the electronic versions of both books.

Jan L. Harrington (2010) *SQL: Clearly Explained*, Third Edition. Morgan Kaufmann.

→ <http://www.sciencedirect.com/science/book/9780123756978>

Jan L. Harrington (2009) *Relational Database Design and Implementation: Clearly Explained*, Third Edition. Morgan Kaufmann.

→ <http://www.sciencedirect.com/science/book/9780123747303>

Students who choose to use the electronic copies are advised to download the required chapters ahead of time, since the website may occasionally be down. (Unavailability of the electronic resources at the necessary time or software problems related to their use will not be accepted as valid reasons for late assignments.) The links provided above would work from campus. To access those resources from off-campus, please look for links on the blackboard site or search for the books in the library catalogue.

Assessment and Grading Policies

Your grade will consist of three assignments and the final. Two of the assignments will be individual and one can be done in groups of up to 3 students.

For the first assignment, worth 15% of the grade, you will use SQL to perform queries on existing databases, create simple tables and import data into them. You will also be asked to answer questions related to the materials from the first several weeks.

For the second assignment, worth 15% of the grade, you will do exercises related to designing and implementing a database and answer questions related to the material from the corresponding weeks.

The third assignment is a group project. You will design and implement your own database system with a web interface. The assignment will consist of two submissions, which are jointly worth 30% of the grade. The first submission is a project proposal, worth 5% of the grade. The second submission is the actual implementation and a report, worth 25% of the grade.

The final, worth 40% of the grade, will test your understanding of the material from the whole semester through multiple-choice, short-answer and essay questions.

Grading Scheme

Assignment	Weight	Due Date	Type
Assignment 1: SQL	15%	October 6, 2010	individual
Assignment 2: Database Design	15%	October 20, 2010	individual
Project Proposal	5%	November 3, 2010	group
Project Report	25%	November 24, 2010	group
Final Exam	40%		individual

Final Exam

YES	<input checked="" type="checkbox"/>
NO	<input type="checkbox"/>

[If yes, please include following details:]

Duration (2 or 3 hours)	2 hours
Tablet Arms (Yes or No)	No
Aids Permitted (Yes or No, if yes, explain)	No
Audio-visual Requirement (enter details)	None
Open-Book (Yes or No)	No

Weekly Class Schedule and Readings

Updated on 09/13/10.

Abbreviations for the two books that we will be primarily using:

- **SQL:** Jan L. Harrington (2010) *SQL: Clearly Explained*, Third Edition. Morgan Kaufmann.
- **RDD:** Jan L. Harrington (2009) *Relational Database Design and Implementation: Clearly Explained*, Third Edition. Morgan Kaufmann.

Week 1 | September 8

Introduction

Databases in the context of modern information systems. Types of databases. A glimpse of SQL.

- RDD ch. 1, “The Database Environment”
-

Week 2 | September 15

Relational Databases and SQL

The relational data model. Simple SQL retrieval.

- SQL ch. 1, “The Relational Data Model” ← **now optional, though recommended**
 - SQL ch. 2, “Relational Algebra,” pages 29–36 ← **pages 36–63 moved to Week 3**
 - SQL ch. 3, “Introduction to SQL”
 - SQL ch. 4, “Simple SQL Retrieval”
 - SQL ch. 7, “Working with Groups of Rows”, pages 161–177 ← **added**
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Week 3 | September 22

More SQL

Queries using multiple tables.

- SQL ch. 2, “Relational Algebra,” pages 36–63 ← **moved from Week 2**
 - SQL ch. 5, “Retrieving Data from More than One Table”
 - SQL ch. 8, “Data Modification”
-

Week 4 | September 29

Database Design

Requirements analysis. The ER model. ER diagrams.

- RDD ch. 2, “Systems Analysis and Database Requirements”
 - RDD ch. 3, “Why Good Design Matters”
 - RDD ch. 4, “Entities and Relationships”
-

Week 5 | October 6

Converting a Database Design into a Relational Form

- ▶ **Assignment # 1 due at the beginning of the class.**

Translating an ER diagram into relational form. Normalization.

- RDD ch. 6, “Normalization”
-

Week 6 | October 13

Implementing a Database with SQL

Implementing a database with SQL. Inserting and modifying data.

- SQL ch. 9, “Schemas and Tables” ← **moved from Week 3**
- SQL ch. 11, “Keeping the Design Up to Date”
- RDD ch. 10, “Using Case Tools for Database Design”

- RDD ch. 11, “Database Design Case Study 1: Mighty Mite Motors”
-

Week 7 | October 20

Embedded SQL

- ▶ **Assignment # 2 due at the beginning of the class.**

Using an SQL database from within a program. PHP. ~~Stored procedures.~~

- PHP Tutorial: <http://www.w3schools.com/PHP/>
-

Week 8 | October 27

Databases and Documents

Full-text search. Markup languages. XML, YAML, JSON. Markup languages as input or output format. XML support in databases.

- SQL ch. 17, “XML Support”
-

Week 9 | November 3

Databases and Objects

- ▶ **Project proposal due at the beginning of the class.**

Object-oriented programming. Object-relational mapping. Objects in databases.

- SQL ch. 18, “The Object-Relational Data Model”
 - SQL ch. 19, “Object-Relational Support”
-

Week 10 | November 10

Database Security

Access rights. ~~Views.~~ Firewalls. SQL injection attacks. ~~Stored procedures.~~ Denial of service attacks. Backup and recovery.

- SQL ch. 12, “Users and Access Rights”
 - RDD ch. 15, “Database Security”
-

Week 11 | November 17

Storage, Structure, and Performance

Representing tables. Performance. Indexing. Storage Engines. Transactions. Backup. RAID.

- none
-

Week 12 | November 24

Finishing up and review. Databases and Grid Computing.

- ▶ **A paper copy of the project report and the digital submission due at the beginning of the class.**

Finishing topics from Week 11. Review. Virtualization and grid computing.

- none!
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Course Communication Policy

Only student Utormail accounts should be used for course communication. All emails from students must include the course code ("CCT395") in the subject line and should be signed with the student's full name. The students should expect their questions to be answered in 2 business days. (If you do not hear back within two days, please resend your message.) Before sending an email, please check if the requested information is available in the course outline, assignment handouts, announcements posted on Blackboard or emails from the instructor. Questions on the content of the course that are likely to require lengthy explanations should ideally be asked in class or brought to office hours. (The students are invited to make use of office hours.)

The instructor may send course-related announcements to the students by email. The students are responsible for making sure they receive those announcements and read them.

Assignment Submission

Students should submit assignments by bringing a **paper copy** to class on the day the assignment is due. Some of the assignments will *also* require an electronic submission. Please note that such electronic submissions are *in addition to* the paper copy, not an alternative to it.

All written assignments should also satisfy the following requirements:

- Student's full name and student number shown in the upper right corner of the first page
- Stapled
- Adhering to specified word limit
- Using 12 point serif font (like "Times New Roman") for normal text
- Using a proportional font (like "Courier") of reasonable size for code
- 1.5 spaced. (Leave code single-spaced, though.)
- 2 cm margins
- No cover page

Assignments that fail those requirements **will not be accepted**. The students will be asked to resubmit the assignment, which will be subject to penalty for lateness.

Late Assignments and Missed Exams

You are expected to complete assignments on time. There will be a penalty for lateness of 3% deducted for each day or part of a day that the assignment is late. Assignments that are due at the beginning of a class will be considered late if they are not handed in at the moment when the class is scheduled to begin. Work that is not handed in one week after the due date will not be accepted.

As of September 2010, students are **required to declare their absence on ROSI**, in order to receive academic accommodation for any course work such as missed tests, late assignments, and final examinations. In addition to this policy, students must also adhere to the following CCIT policy after declaring an absence on ROSI.

Deadline extensions will be granted only for a compelling reason and with appropriate documentation and students should contact instructors immediately, and no later than the due date, if a deadline cannot be met.

The Office of the Registrar handles all missed final exams.

Academic Integrity

According to University of Toronto *Code of Behaviour on Academic Matters* it is an academic offense for a student to knowingly "represent as one's own any idea or expression of an idea or work of another in any academic examination or term test or in connection with any other form of academic work, i.e. to commit plagiarism." Committing plagiarism "knowingly" includes the cases where the student ought reasonably to have known that they are presenting as their own work done by someone else.

The University of Toronto treats academic offenses very seriously. Students suspected of academic misconduct will be subject to a formal process to determine whether an academic offense has in fact been committed. For students convicted of a academic offense the consequences can be quite severe. Please consult the *Code of*

*Behaviour on Academic Matters*¹ and the *Code of Student Conduct*,² for more information your rights and responsibilities and the range of possible sanctions for academic offenses.

Students should familiarize themselves with the following website, which provides details suggestions on how to avoid plagiarism:

→ <http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize>

Classroom Management

Students are expected to come to class on time. Cell phones and other mobile devices can never be used during class time and should be kept in silent mode.

Use of laptops in class is strictly restricted to note-taking and demonstration sessions. Students who wish to use their laptops for taking notes **must sit in the front row of the classroom**. Students sitting elsewhere and wishing to use their laptops before the beginning of the class are responsible for making sure that their laptops are not visible by the time the class is scheduled to start.

Religious Observance

Students whose religious observances may conflict with the course schedule should consult University's Policy on Scheduling of Classes and Examinations and Other Accommodations for Religious Observances.³

Other Resources

AccessAbility

The University accommodates students with disabilities who have registered with the AccessAbility Resource Centre. Please let me know in advance, preferably in the first week of class, if you will require any accommodation on these grounds. To schedule a registration appointment with a disability advisor, please call the Centre at 905-569-4699 or e-mail at: access.utm@utoronto.ca.

→ <http://www.utm.utoronto.ca/access/>

Robert Gillespie Academic Skills Centre

Students can visit the Academic Skills Centre to consult with one of its strategists about understanding learning style, developing study plans for upcoming tests/exams, or discussing papers. Special Diagnostic Assessments are also offered and are designed to help you learn exactly where you stand with respect to critical academic skills.

→ <http://www.utm.utoronto.ca/asc>

UTM Library (Hazel McCallion Academic Learning Centre)

The University of Toronto boasts the biggest academic library in Canada and the second biggest in North America. Various services are available to students at the UTM Library and across the UofT library system. Services include borrowing, interlibrary loans, online references, laptop loans and the RBC Learning Commons.

→ <http://library.utm.utoronto.ca>

Every attempt will be made to follow this syllabus, but its contents are subject to change, according to the rules outlined in the UTM Instructor's Handbook, section 3.2.2.

1 <http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>

2 <http://www.governingcouncil.utoronto.ca/policies/studentc.htm>

3 <http://www.governingcouncil.utoronto.ca/policies/religious.htm>