



# CSCI 2141: Introduction to Database Systems

## Winter 2024 - Section 1

### Course Syllabus

#### Instructor and TA Information

<b>Instructor:</b>	Prof. Robert Beiko (MC4232) <small>pronounced "Beeko"</small> Office Hours: Friday, 2PM-3PM
<b>E-mail:</b>	<a href="mailto:beiko@cs.dal.ca">beiko@cs.dal.ca</a> (Please put "2141" in the subject line)
<b>Class Time</b>	TR 1:05 – 2:25, Tupper Lecture Theatre "B"
<b>Lab Times</b>	Section B01: M 10:05 – 11:25 Dunn 304 Section B02: T 10:05 – 11:25 Dentistry 4116 Section B03: R 08:35 – 09:55 Goldberg 134 Section B04: R 08:35 – 09:55 Goldberg 143 Section B05: W 08:35 – 09:55 Goldberg 134 Section B06: M 10:05 – 11:25 CHEB C150
<b>Homepage:</b>	<a href="https://dal.brightspace.com/d2l/home/307129">https://dal.brightspace.com/d2l/home/307129</a>

#### Important Dates

See [https://www.dal.ca/academics/important\\_dates.html](https://www.dal.ca/academics/important_dates.html) for the official version of this list.

- Final Withdrawal Date with no financial penalty: January 22
- Munro Day (University closed): Monday, February 2
- Final Withdrawal Date without academic penalty: February 6
- Nova Scotia Heritage Day (University closed): February 19
- Winter Study Break (no classes): February 19-23
- Good Friday (University closed): March 29
- Bonus Fridays (no lectures or labs): April 8-9
- Exam period: April 11-23

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## Course Description

Our lives are run by databases. As professional computer scientists you're almost certain to interact with them at some point in your career, and understanding how they are designed and how they work is vital. This course will introduce you to the design fundamentals and the principles we need to worry about when building any database. Central principles such as accuracy, efficiency, and security must be considered for all databases regardless of size or type.

Once we have learned some database fundamentals and have some ideas about design, we will start building and interacting with databases using the Structured Query Language (SQL). Building from small problems, the goal is to get to a point where you can identify interesting data sets and apply what you have learned to build sensible databases around them.

This course focuses on a single database model (relational), a single database management system (MySQL), and a single query language (Structured Query Language: SQL). These provide a solid foundation of knowledge that can lead to applications in other DBMSs, data science and machine learning, and newer paradigms such as NoSQL.

## Key Learning Outcomes

**Design, build, and query databases using sound principles.**

### *Theory:*

- List the advantages and disadvantages of using a database
- Distinguish first, second, and third normal forms
- Identify the key concepts and entities in the relational model

### *Design:*

- Create and identify appropriate business rules
- Construct an entity-relationship diagram
- Choose appropriate table structures and indexing to optimize database design

### *Application:*

- Create a database in MySQL
- Create a set of tables from an entity-relationship diagram
- Import data through SQL statements or local files
- Understand and implement key database functions:
  - o Data retrieval on single and joined tables
  - o Views
  - o Stored procedures
  - o Triggers
- Optimize SQL queries

## Course Rationale

Databases are critically important and a CS degree without at least one database course would be kind of strange.

## Class Format and Course Communication

Content will be delivered via a combination of lectures and labs. The lectures will be recorded. Attendance is mandatory on evaluation days (quizzes, midterm, practicums) and strongly encouraged on the rest. **Note that the evaluation schedule may need to change**; we will give as much notice as possible in these situations.

We have a dedicated Team which will be the first point of contact for course-related questions. It's highly likely that others in the class have the same question as you, so posting it in the shared forum will benefit others as well. The join code is '**prigpuc**'.

Course announcements will be posted to the course Team and Brightspace pages, but you must join the Team to ensure you're up to date on critical information.

We will use **MySQL Workbench** for practice, entity/relationship diagrams and forward/reverse engineering. The free download is here: <https://dev.mysql.com/downloads/workbench/>.

## Course Evaluation

### General

Except where noted, all evaluations are **closed book**. We will provide you with limited reference material in some situations, but unauthorized access to the Internet or other resources via laptops, smartphones, smart-watches, etc. is forbidden.

SDAs are not accepted and there are no make-up exams, practicums, or mid-terms. The grading scheme takes some level of disruption into account. If you have health concerns or other matters that are likely to impact more than one or two assessments, please contact the Assistant Dean Undergraduate Students ([fcsa-dus@dal.ca](mailto:fcsa-dus@dal.ca)) and/or the Student Accessibility Centre ([access@dal.ca](mailto:access@dal.ca)) to develop a longer-term plan.

Quizzes, practicums, and exams must be conducted on site – this means in your course section for the quizzes and the midterm, in your designated lab section for the practicums, and in the location specified by Dalhousie for the final exam. Accessing any graded lab material from outside of these locations will be treated as cheating and reported to the Academic Integrity Officer.

We may need to reschedule evaluations or change deadlines in the event of disruptions such as weather. We will not, however, make individual exceptions. Any changes will be announced in Brightspace and the course Team with as much advance notice as possible.

- **Quizzes (15%)** will be conducted in **Brightspace** during class time.
  - The quizzes are **closed book** and you will be required to use the Respondus Lockdown Browser.
  - Five quizzes at 5% each, the top 3 will contribute to your final grade.
  - Most weeks without graded quizzes will have a practice quiz on Thursday. You will be allowed to use online resources if you like, but the practice quizzes must be completed individually and *quietly*.
  - Quizzes must be completed in your own course section (1 or 2) – no switching.
  - Quiz dates:
    - January 25
    - February 8
    - March 14
    - March 28
    - April 4
- **Lab practicums (15%)** will consist of a series of coding questions to be answered individually during the lab time. We will generally provide a basic command reference and the database schema, but no online resources or other tools may be used.
  - Five in-lab exercises at 5% each, top 3 will contribute to your final grade.
  - Lab sessions without graded practicums will have practice problems of a similar style. These can be done collaboratively, on your own, with assistance from online sources, etc.
  - You must use concepts that have been introduced in class to answer practicum questions.
  - We will use **Codio** for all graded in-lab exercises.
  - You must attend the lab session you are signed up for; students are not allowed to move between labs. You must notify us if you change your lab registration in Dal Online.
    - Graded practicum weeks: Jan 29, Feb 12, Mar 4, Mar 18, Apr 1

- The **Course Project (25%)** will involve you choosing an interesting data set, designing and creating a database to efficiently store the data, and constructing a series of queries of varying complexity to ask interesting questions from the database.
  - **Project part 1:** Identify and describe data, determine business rules, construct entity-relationship diagram. (5%)
  - **Project part 2:** Design and create database, execute simple queries. (10%)
  - **Project part 3:** Execute optimized queries (10%)
  - **Project component deadlines:** February 2, March 8, April 8
  - Project components are due at **11:59PM** on the designated date. Late submissions will be accepted for 24 hours but will incur a 10% penalty. No submissions will be accepted after the second deadline for technical or any other reasons.
- **Exams (45%)**
  - The **midterm** is worth **15%** of the final grade and will consist of multiple-choice questions, definitions, and problems in some combination. It will be written in regular class time (although we may try and book a larger room if one is available).
    - Midterm date: February 29
  - The **final exam** covers the entire course and is worth **30%** of the final grade. It will be structured similarly to the midterm.
  - The final exam grade can replace the midterm if it is higher.

## Notes

- A minimum grade of C is required in this course if it is core to your FCS degree, or if it will be used as a prerequisite for a subsequent CSCI course.
- As of 2019, students who receive a grade lower than C in the same required CS course twice, will be dismissed.
- The grade conversion scale in Section 17.1 of the Academic Regulations, Undergraduate Calendar will be used.  
<https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=111&chapterid=6817&topicgroupid=29869&loaduseredits=False>

## Student Declarations of Absence

SDAs will not be accepted. Dropping quiz/practicum grades and the late option on assignments is meant to provide the necessary flexibility.

## Quiz, Midterm and Final Exam Requirements

- Photo ID is required. Students will need to sign in to confirm their presence on the day of the evaluation.
- Closed book
- No dictionaries, notes, calculators, cell phones, PDAs, talking slide rulers, or other electronic aids allowed.

### Academic Standards

Failure to properly attribute sources in your work will be treated as an academic standards issue and points may be deducted for not following citation requirements. For example, forgetting to quote text taken from other sources, failure to include in-text citations, or a failure to include required information in the citations or references. Please see the resources on proper citation provided by the Dalhousie Writing Center (<https://dal.ca/libguides.com/c.php?g=257176&p=5001261>).

Please note that if it appears that the error was made with intent to claim other people's work as your own such as a lack of both citations and references, an allegation of plagiarism will be submitted to the Faculty Academic Integrity Officer, which could result in consequences such as a course failure.

### Texts and Resources

- The course structure is strongly influenced by this textbook:
  - Coronel C and Morris S. *Database Systems: Design, Implementation, & Management*, 14th Edition. Cengage Management, 2022. The core material differs very little from the 13<sup>th</sup> edition which was used previously in the class (and presumably earlier editions too).
- The lecture slides will be posted on the learning management system (Brightspace).
- Lectures will be recorded in Panopto and made available with subtitles in Brightspace.
- Additional assistance is available from the Student Learning Centre (2nd floor, Goldberg CS Bldg.).

### Prerequisites

CSCI 1100.03 or CSCI 1101.03 or CSCI 1105.03 or CSCI 1110.03 or CSCI 2202.03

### Responsible Computing Policy

Usage of all computing resources in the Faculty of Computer Science must be within the Dalhousie Acceptable Use Policies (<http://its.dal.ca/policies/>) and the Faculty of Computer Science Responsible Computing Policy. For more information please see [https://www.cs.dal.ca/downloads/fcs\\_policy\\_local.pdf](https://www.cs.dal.ca/downloads/fcs_policy_local.pdf)

### Use of Plagiarism Detection Software

All submitted code may be passed through a plagiarism detection software, such as the plagiarism detector embedded in Codio, the Moss (<https://theory.stanford.edu/aiken/moss/>) Software Similarity Detection System, or similar systems. If a student does not wish to have their assignments passed through plagiarism detection software, they should contact the instructor for an alternative. Please note, that code not passed through plagiarism detection software will necessarily receive closer scrutiny. [https://cdn.dal.ca/content/dam/dalhousie/pdf/dept/university\\_secretariat/policy-repository/OriginalitySoftwarePolicy.pdf](https://cdn.dal.ca/content/dam/dalhousie/pdf/dept/university_secretariat/policy-repository/OriginalitySoftwarePolicy.pdf)

### Use of Artificial Intelligence Tools

**You may use AI-driven tools to assist your learning, but unless otherwise specified you may not use them to produce work to be submitted for either formative or summative evaluations. Due to the nature of this**

course, it would be impractical and more difficult to assess students properly if AI tools were allowed. For this reason, and even if these tools will be valuable tool in your career, their use is restricted so that your learning may be assessed. Using AI-driven tools when producing submitted work constitutes an academic offence.

### Culture of Respect<sup>1</sup>

Every person has a right to respect and safety. We believe inclusiveness is fundamental to education and learning. Misogyny and other disrespectful behaviour in our classrooms, on our campus, on social media, and in our community is unacceptable. As a community, we must stand for equality and hold ourselves to a higher standard.

#### What we all need to do:

1. **Be Ready to Act:** This starts with promising yourself to speak up to help prevent it from happening again. Whatever it takes, summon your courage to address the issue. Try to approach the issue with open-ended questions like “Why did you say that?” or “How did you develop that belief?”
2. **Identify the Behaviour:** Use reflective listening and avoid labeling, name-calling, or assigning blame to the person. Focus the conversation on the behaviour, not on the person. For example, “The comment you just made sounded racist, is that what you intended?” is a better approach than “You’re a racist if you make comments like that.”
3. **Appeal to Principles:** This can work well if the person is known to you, like a friend, sibling, or co-worker. For example, “I have always thought of you as a fair-minded person, so it shocks me when I hear you say something like that.”
4. **Set Limits:** You cannot control another person’s actions, but you can control what happens in your space. Do not be afraid to ask someone “Please do not tell racist jokes in my presence anymore” or state “This classroom is not a place where I allow homophobia to occur.” After you have set that expectation, make sure you consistently maintain it.
5. **Find or be an Ally:** Seek out like-minded people that support your views, and help support others in their challenges. Leading by example can be a powerful way to inspire others to do the same.
6. **Be Vigilant:** Change can happen slowly, but do not let this deter you. Stay prepared, keep speaking up, and do not let yourself be silenced.

### University Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and the Senate. <https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=111&loaduseredits=False>

### Territorial Acknowledgement

Dalhousie University is located in Mi’kma’ki, the ancestral and unceded territory of the Mi’kmaq. We are all Treaty people.

### Internationalization

At Dalhousie, ‘thinking and acting globally’ enhances the quality and impact of education, supporting learning that is “interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders.” <https://www.dal.ca/about-dal/internationalization.html>

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<sup>1</sup> Source: Speak Up! © 2005 Southern Poverty Law Center. First Printing. This publication was produced by Teaching Tolerance, a project of the Southern Poverty Law Center. Full “Speak Up” document found at: <http://www.dal.ca/dept/dalrespect.html>. Revised by Susan Holmes from a document provided April 2015 by Lyndsay Anderson, Manager, Student Dispute Resolution, Dalhousie University, 902.494.4140, [lyndsay.anderson@dal.ca](mailto:lyndsay.anderson@dal.ca) [www.dal.ca/think](http://www.dal.ca/think).



***Academic Integrity***

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect. As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. (read more: [http://www.dal.ca/dept/university\\_secretariat/academic-integrity.html](http://www.dal.ca/dept/university_secretariat/academic-integrity.html))

***Accessibility***

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. If there are aspects of the design, instruction, and/or experiences within this course (online or in-person) that result in barriers to your inclusion please contact: [https://www.dal.ca/campus\\_life/academic-support/accessibility.html](https://www.dal.ca/campus_life/academic-support/accessibility.html) for all courses offered by Dalhousie with the exception of Truro.

***Conduct in the Classroom — Culture of Respect***

Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

***Diversity and Inclusion — Culture of Respect***

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). (read more: <http://www.dal.ca/cultureofrespect.html>)

***Student Code of Conduct***

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. (read more: [https://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-con.html](https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-con.html))

***Fair Dealing Policy***

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie. (read more: [https://www.dal.ca/dept/university\\_secretariat/policies/academic/fair-dealing-policy.html](https://www.dal.ca/dept/university_secretariat/policies/academic/fair-dealing-policy.html))

***Originality Checking Software***

The course instructor may use Dalhousie's approved originality checking software and Google to check the originality of any work submitted for credit, in accordance with the Student Submission of Assignments and Use of Originality Checking Software Policy. Students are free, without penalty of grade, to choose an alternative method of attesting to the authenticity of their work, and must inform the instructor no later than the last day to add/drop classes of their intent to choose an alternate method. (read more:



[https://www.dal.ca/dept/university\\_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality.html](https://www.dal.ca/dept/university_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality.html))

***Student Use of Course Materials***

These course materials are designed for use as part of the CSCI courses at Dalhousie University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as books, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this course material for distribution (e.g. uploading material to a commercial third party website) may lead to a violation of Copyright law.

***Learning and Support Resources***

Please see [https://www.dal.ca/campus\\_life/academic-support.html](https://www.dal.ca/campus_life/academic-support.html)