CIV E 603: Construction Informatics

Course Outline

1 Course Description (calendar description)

4.5 *(fi 6)* (either term, 3-0-3) Computer-aided information management in construction, including relational database development and management, application of data mining techniques, computer programming, and application of computers in the planning, organization and control of construction projects.

2 Course Learning Outcomes

This course introduces various aspects of information management and computer applications within the construction domain to familiarize students with the use and capabilities of these applications for research and industrial purposes. Upon successful completion of this course, students should have the knowledge and skills to:

- Develop basic computer programs using Python programming language and use them with other software applications.
- Analyze and model small scale enterprise information systems using different types of diagrams and flow charts.
- Build and use small scale relational databases and use SQL to query them.
- Apply data mining and machine learning methods and techniques to problems in the construction domain.
- Leverage AI tools (e.g., ChatGPT, Copilot, RapidMiner assistants) as learning aids for programming, database queries, and data mining, while critically verifying their outputs.

This course is an important pre-requisite for the rest of your program. You will find the tools and techniques taught in this course useful in other courses, in practice, and for your research.

3 Teaching Team

Principal Instructor: Dr. Yasser Mohamed email: yaly@ualberta.ca

Office/Zoom Hours: TBD

Teaching Assistant: TBD

If the hours above do not fit your schedule, you can contact me to setup a different time that would work for both of us. Email to the address above is the preferred method of communication. Responses to email outside normal working hours are not promised, or to be expected. In your email, please indicate CIVE 603 in the subject line and sign your full name and ID#. Strive for clear, concise and complete communication.

1 Timing and Location

Lectures:	Tuesday. 11:00 am – 1:50 pm	**Room:**	**NRE L2-020**
Labs:	Thursday. 2:00 pm – 4:50 pm	**Room:**	**GSB 2-17**

In the case of instructor illness or unforeseen conditions, recorded lecture material will be made available on Canvas for asynchronous learning.

4 Marking Scheme

The weighted average of all grades will result in a final percentage mark and will be converted into your final letter grade. Percentage scores, not a standard distribution, will determine grades. The final grade distribution will be assessed based on a combination of the class distribution and absolute percentage results. There is no fixed distribution of grades. The course mark will be calculated based on the following breakdown:

4.1 Online participation (weekly activities) - 7%

Online course materials will include some activities that you need to complete every week such as polls, posting of questions, participation in online forum, and/or quizzes.

4.2 Lab assignments (10 lab assignments) - 18%

Lab assignments address the practical aspects of the concepts presented through lecture sessions. A brief presentation (20 to 30 minutes will be used to cover the topics related of each lab assignment). Assignments are designed to be completed during the lab time and are, typically, due the Monday after the lab at 1600 hours. You may work in groups on lab assignments to discuss the problems; however, lab assignments are to be completed and submitted individually. During the lab, a TA will be available to answer questions.
Note: You may use AI tools for assistance in lab assignments, but you must verify outputs and ensure your submission reflects your own understanding.

4.3 Homework assignments (4 assignments) - 35%

Each homework assignment is designed to cover one of the four main topics in the course and the weight on each assignment is proportional to the material covered (information modeling, computer programming, relational databases, and data mining).
Optionally, you may include an AI Use Appendix describing how AI assisted you, if applicable.

4.4 Group Project (presentation and report, each group is 2 or 3 students) - 40%

Term projects should be related to one, or combination, of the three main topics in the course. You should choose your project team during the first month of the course. Shortly after, a project proposal is due (tentatively halfway through the course). Project evaluations will be based on a final presentation and a report submitted by each team. More details will be given throughout the semester about the project delivery timeline and to help you decide and successfully complete your project.
Groups may use AI tools for idea generation, debugging, or workflow planning, but must document how AI was used and verify the outputs.

5 References

Data Mining: Practical Machine Learning Tools and Techniques (Third Edition) Ian H. Witten, Eibe Frank and Mark A. Hall Elsevier Inc., © 2011 (ISBN: 978-0-12-374856-0)

Beginning Database Design and Implementation Gavin Powell Wrox Press, © 2006 (ISBN: 0764574906) (books 24x7)

Python for Everybody (PDF book) https://www.py4e.com/

The Carpentries https://carpentries.org/

6 Policies & General Requirements

Policy about course outlines can be found in § 23.4(2) of the University Calendar

6.1 General Requirements:

a. Observe professional courtesies and be on time. Lecture and lab sessions will start and finish on time.
b. Turn off cell phones and other noisy devices during lectures and labs.
c. Learn actively during lecture and lab sessions by asking questions and participating in discussions; we are here to help you get the most out of this course, but we cannot read your mind.
d. Be a team player and acknowledge your study partners. Contribute your best effort to your group in the problem-solving labs and in your final project.

6.2 Course website:

Log in to Canvas on the University of Alberta home page to access the course website. All notes and handouts for both lecture and lab sessions, assignments and solutions will be posted on the Canvas website.

6.3 Assignment Submission:

All assignments must be submitted on the due time. Late assignments will be evaluated and provided with feedback, but you will receive a grade of zero. You must prepare and submit each assignment in professional manner. Take pride in the quality of your technical work, clearly state your assumptions and conclusions.

6.4 Academic Integrity:

The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at https://www.ualberta.ca/governance/resources/policies-standards-and-codes-of-conduct/code-of-student-behaviour.html) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

6.5 Recording Course Material:

Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

6.6 Material during Exam:

Only those items specifically authorized by the instructor may be brought into the exam facility. The use of unauthorized personal listening, communication, recording, photographic and/or computational devices is strictly prohibited. Students should refrain from bringing any unauthorized electronic device into an examination room, including cell phones, high tech watches, high tech glasses or other such devices.

6.7 Students with Disabilities:

Students who require accommodation in this course due to a disability are advised to discuss their needs with Specialized Support & Disability Services (2-800 Students' Union Building).

6.8 Academic Support Centre:

Students who require additional help in developing strategies for better time management, study skills or examination skills should contact the Student Success Centre (2-300 Students' Union Building).

6.9 Protection of Privacy:

Personal information is collected under the authority of Section 33(c) of the Freedom of Information and Protection of Privacy Act (Alberta) directly by the University or by an authorized service provider on behalf of the University, and will be protected under Part 2 of that Act. Recordings of this course will be used for the purposes of student learning and will be disclosed to other students enrolled in this section of the class and to Teaching Assistants and other instructors and in accordance with section 40 of the FOIP Act. Recordings will be made available until the end of term. Please direct any questions about this collection to the professor of this course [Yasser Mohamed, yaly@ualberta.ca].

6.10 Expectations for AI use

In this course, we commit to AI use guided by ethical and transparent principles. While students are allowed to use advanced automated tools (such as ChatGPT or Dall-E 2) for certain written assignments, it is crucial to adhere to the following guidelines:
Seek prior approval from the instructor for AI use in specific assignments.
When allowed, clearly attribute and cite any AI-generated content in your work, including prompts and AI outputs as part of your academic record. Include an additional reflection component in your assessments, discussing how AI tools contributed to your learning process.
IMPORTANT: Please note that AI use is strictly prohibited in assessments and assignments not approved by the instructor. Failure to abide by this guideline may be considered an act of cheating and a violation as outlined in the relevant sections of University of Alberta (November 2022) Code of Student Behaviour.

In this course, AI tools (such as ChatGPT, GitHub Copilot, or RapidMiner extensions) are allowed as optional learning aids. These tools may help you generate examples, debug code, draft SQL queries, or interpret machine learning workflows.
Guidelines for use:

- AI is a partner, not a replacement – you must understand and verify all work you submit.
- Academic integrity matters – assignments must reflect your own reasoning.
- Transparency – if you use AI, briefly note how it assisted you (e.g., in an AI Use Appendix).
- Equity of access – free AI tools are sufficient; paid tools are not required.
  Some assessments may be AI-free to ensure independent competence.

Disclaimer: Any typographical errors in this Course Outline are subject to change and will be announced during class.

7 Course Schedule

Lectures Schedule

Week	Date	Topic	Notes
1	2025-09-02	Course introduction	
2	2025-09-9	Enterprise systems	
3	2025-09-16	Information modelling	
4	2025-09-23	Relational databases	
5	2025-9-30	Relational databases	
6	2025-10-7	Relational databases	
7	2025-10-14	Alternative database structures	
8	2025-10-21	Data mining - Introduction	
9	2025-10-28	Data mining - Classification	
10	2025-11-04	Data mining - Classification	
Reading Week (November,10 to 14)			
11	2025-11-18	Data mining - Evaluation and Validation	
12	2025-11-25	Data mining - Clustering	
13	2025-12-02	Advanced data mining techniques and applications	

Lab Schedule

Week	Date	Topic	Notes
1	2025-09-04	Python programming	
2	2025-09-11	Python programming	
3	2025-09-18	Python programming	
4	2025-09-25	Python programming	
5	2025-10-02	Databases & SQL	
6	2025-10-9	Databases & SQL	
7	2025-10-16	Databases & SQL	
8	2025-10-23	Databases & SQL	
9	2025-10-30	Data mining	
10	2025-11-06	Data mining	
Reading Week (November, 10 to 14)			
11	2025-11-20	Data mining	
12	2025-11-27	Data mining	
13	2025-12-04	TBD	