

## CS465: Data Mining Fall, 2025

**Instructor:** Howard J. Hamilton, CW308.21, #585-4079

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**Lectures:** CL 127, MWF 11:30 am – 12:20 pm.

**Office Hours:** MWF 12:20 pm – 1:00 pm. I will first talk to students immediately outside the classroom and then I will proceed to my office (CW 308.21).

**Description:** Knowledge Discovery from Data (KDD). Topics include knowledge discovery, data preparation, data warehousing, pattern mining, classification and regression, cluster analysis, outlier detection, mining complex data types.

**Prerequisites:** CS 340, CS 365, and CS 375.

**Textbook:** *Data Mining: The Textbook*, by Charu C. Aggarwal, Springer, 2015

<https://link.springer.com/book/10.1007/978-3-319-14142-8>

### Additional Resources:

- *Learning Data Mining with Python*, by Robert Layton, O'Reilly, 2<sup>nd</sup> Ed., 2017  
<https://www.oreilly.com/library/view/learning-data-mining/9781787126787>
- *Introduction to Data Science: A Python Approach to Concepts, Techniques and Applications*, by Laura Igual and Santi Seguí, Springer, 2<sup>nd</sup> Ed., 2024  
<https://link.springer.com/book/10.1007/978-3-031-48956-3>
- *Data Science Concepts and Techniques with Applications*, by Usman Qamar and Muhammad Sammair Raza, Springer, 2<sup>nd</sup> Ed., 2023  
<https://link.springer.com/book/10.1007/978-3-031-17442-1>

**Undergraduate Calendar:** University of Regina, Office of the Registrar, [2025 Version](#)

### Grading

- **Participation:** 5%, attendance and in-class participation.
- **Quizzes:** 5%, in-class pop quizzes.
- **Assignments:** 12%, 6 assignments.
- **Midterm Exams:** 38% = 2 x 19%, in class on October 10 and November 7.
- **Final Exam:** 40%, in-person on Friday, December 19, 2:00pm – 5:00pm.
- **Discretionary:** ±5% marks assigned by Dr. Hamilton to ensure final grades reflect student knowledge.



**Course Schedule (Tentative):**

Lecture	Date	Information	Content
1	Sept. 3	First Class	Knowledge discovery
2	Sept. 5		Introduction to Assignment 1
3	Sept. 8		CS 165/265/365 review
4	Sept. 10		Data cubes
5	Sept. 12		Data cubes
6	Sept. 15	Last Add/Drop	Classification and regression
7	Sept. 17	<b>A1 Due Wed. Sept. 17</b>	Classification and regression
8	Sept. 19		Classification and regression
9	Sept. 22		Introduction to Assignment 2
10	Sept. 24		Decision trees and random forests
11	Sept. 26		Decision trees and random forests
12	Sept. 29		Item sets & Association rules
13	Oct. 1	<b>A2 Due Wed. Oct. 1</b>	Item sets & Association rules
14	Oct. 3		Introduction to Assignment 3
15	Oct. 6		Item sets & Association rules
16	Oct. 8		Divisive clustering
17	Oct. 10	<b>Midterm 1</b>	Midterm 1
	Oct. 13	No Class	
18	Oct. 15		Midterm 1 discussion
19	Oct. 17	<b>A3 Due Sun. Oct. 19</b>	Divisive clustering
20	Oct. 20		Introduction to Assignment 4
21	Oct. 22		Agglomerative clustering
22	Oct. 24		Agglomerative clustering
23	Oct. 27		Outlier detection
24	Oct. 29		Outlier detection
25	Oct. 31	<b>A4 Due Sun. Nov. 2</b>	Time-series forecasting
26	Nov. 3		Introduction to Assignment 5
27	Nov. 5		Time-series forecasting
28	Nov. 7	<b>Midterm 2</b>	Midterm 2
	Nov. 10–14	No Class	
29	Nov. 17	Last W-Drop	Midterm 2 Discussion
30	Nov. 19	<b>A5 Due Wed. Nov. 19</b>	Graph mining
31	Nov. 21		Introduction to Assignment 6
32	Nov. 24		Graph mining
33	Nov. 26		Large Language Models
34	Nov. 28		Large Language Models
35	Dec. 1		Large Language Models
36	Dec. 3	<b>A6 Due Wed., Dec. 3</b>	TBD
37	Dec. 5	Last Class	Review
Final	Dec. 19	<b>Final Exam: Fri. Dec. 19, 2:00-5:00pm, CL 408</b>	

**Learning Objectives:**

1. Review data preparation and data warehousing.
2. Understand classification and regression.
3. Implement solutions to problems with decision trees and random forests.
4. Understand pattern mining, including item sets and association rules.
5. Implement solutions to problems with cluster analysis, including divisive clustering and agglomerative clustering.
6. Understand outliers and outlier detection.
7. Understand time series and time-series forecasting.
8. Comprehend mining complex data types, such as graph mining.
9. Comprehend large language models and retrieval augmented generation.
10. Design and write Python programs using the concepts outlined above.
11. Implement strategies for testing and debugging data mining programs.

**Course Policies**

Please see the U of R Undergraduate Calendar for all rules and regulations. Students are encouraged to understand their rights and obligations as members of the University of Regina's academic community.

- **Conduct:** All students are expected to observe the [Student Code of Conduct](#) (page 47).
- **Academic Supports:** Workshops, tutors, and advisors are available from the [Student Success Centre](#).
- **Communication:** Please come to office hours or message the class Instructor via UR Courses for individual queries. All communication with instructors must be fair, honest, and direct.
- **Lectures:** All students are expected to attend lectures, take notes, and participate in class. Students are responsible for keeping up with and reviewing lecture materials and readings, which will be posted to UR Courses. All students are responsible for being aware of class announcements, including those on UR Courses.
- **Coursework:** It is highly recommended that students complete all assignments. Students who do not complete assignments tend not to do well in the exams. All assignments must be typed and submitted to UR Courses. All assignments must be completed and submitted individually; group submissions, or AI-generated solutions, will receive (at most) fractional credit and may violate academic integrity policy.
- **Late Assignments & Deferment:** Late assignments are not accepted, and exams will not be deferred. In the case of illness, students must complete and sign the [self-declaration form](#), and the weight missed coursework will be transferred to the final exam. If you are ill during the final exam period, you must inform the course instructor or the Associate Dean Academic for the Faculty of Science within 3 days (before or after) of the scheduled final exam to request a deferral. Students must submit a completed [Application for Deferral of Course Work and/or Final Exam](#), including supporting documentation, to the Associate Dean Academic for the Faculty of Science. If you appear at the final exam, no deferral will be

allowed. Details on deferrals and leaves can be found in the Undergraduate academic calendar.

- **Assignment Grading:** This course will use a sample-based approach for marking assignments: not all questions may be graded on each assignment. To aid in reviewing coursework, solutions to all questions will be provided and may be reviewed in class. Any disagreement in grading must be addressed within one week of assignments being returned by contacting the instructor.
- **Accessibility:** The Centre for Student Accessibility upholds the University's commitment to a diverse and inclusive learning environment by providing services and support for students based on disability, religion, family status, and gender identity. Students who require these services are encouraged to contact the [Centre for Student Accessibility](#) as early as possible to discuss academic accommodations and other supports.
- **Academic Integrity:** This course requires students to be honest. Assignments and exams are to help students learn; grades represent how fully this goal is attained. Thus, all work and grades should reflect a student's own understanding and effort. Acts of academic misconduct violate academic integrity and are considered serious offences by the University of Regina. Examples include, but are not limited to, cheating on tests or exams, plagiarizing, copying another's work, or falsifying results.
- **Examination Misconduct:** No computers or electronic devices will be allowed during midterms and the final exam. Instances of academic misconduct will be reported to the Associate Dean Academic for investigation. The consequence of academic misconduct may include a grade of zero, failure in the class, or expulsion from the university. Refer to the Undergraduate academic calendar for details.
- **Artificial Intelligence:** Generative artificial intelligence (AI) tools may be used to assist in the understanding of content in this class. While students are free to use AI in exploring solutions to assigned problem sets, homework submissions should reflect the student's own original understandings and insights. Submitting AI-generated solutions to assignments constitutes a breach of academic integrity.