CS898 - Data Sources for Emerging Technologies

Spring 2025

Course Outline

University of Waterloo, School of Computer Science

Instructor: Gladimir V. G. Baranoski
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Lectures: Tuesday and Thursday, from 10 to 11:20AM, DC2585.
Office Hours: Tuesday, from 11:30-12:30PM, DC3520.

Course Website

`http://pedrinho.cs.uwaterloo.ca/~gvgbaran/CS898-S25.html`

Course Description

The main topics to be addressed during this course are the following:

- availability of data to support the development of computer-based technologies employed in the solution of new and long-standing practical problems, and
- different approaches to cope with data scarcity and reliability issues.

Course Objectives

It has been long recognized that a carefully designed computer model is of little value without reliable data to be used as input or in the evaluation of its fidelity. Accordingly, data scarcity and data reliability represent major challenges for the development of new cost-effective technologies involving the use of computer models to solve a wide range of problems, from the screening of diseases and the prediction of crop yield to the forecast of sand storms and the deployment of autonomous vehicles, just to name a few. In this course, we will explore these issues and discuss different approaches to tackle them.

Reading Materials

Selected papers and additional resources will be provided in the course website, under "Selected Papers" and "Additional Resources", respectively. All papers should be read by the students, preferably before the dates specified in course schedule (available on course website under "Handouts"). These materials will be made available on the course website **at no cost**.

Course Tentative Plan/Schedule

Week	**Date**	**Topic/Activity**
1	May 6	Review of Course Handouts
1	May 8	Biophysical Data Sources
2	May 13	Biophysical Data Sources & Paper (1^{st} round) Selection
2	May 15	Paper Presentation Scheduling (1^{st} round) & Project Guidelines
3	May 20	Paper Presentations
3	May 22	Paper Presentations & Assignment 1
4	May 27	Paper Presentations
4	May 29	Paper Presentations & Project Proposal
5	June 3	Paper Presentations
5	June 5	Paper Presentations: Wrap up & Scheduling (2^{nd} round)
6	June 10	Paper Presentations
6	June 12	Paper Presentations
7	June 17	Paper Presentations
7	June 19	Paper Presentations
8	June 24	Paper Presentations
8	June 26	Paper Presentations: Wrap up & Project Scheduling
9	July 3	Interdisciplinary Applications
10	July 8	Project Overview
10	July 10	Project Overview
11	July 15	Practical Issues, Assignment 2
11	July 17	Practical Issues, Assignment 2
12	July 22	Project Presentations
12	July 24	Project Presentations
13	July 29	Project Presentations Commentary & Written Report

Marking Scheme

- Participation: 10%,
- Assignments (2): 10%.
- Paper Presentation(s): 20%,
- Project Proposal: 5%,
- Project Presentation: 20%,
- Project Written Report: 30%, and
- Project Commentary: 5%.

Important notes:

- The deadline for the submission of paper presentation slides, assignments, project proposal and project presentation slides is **9 AM** Eastern Time (US and Canada) on the days specified in the course schedule available in course website under "Handouts". No automated assignment screening will be performed.
- The deadline for the submission of the project commentary and written report is **10 PM** Eastern Time (US and Canada) on the day specified in the course schedule available in course website under "Handouts".
- Late submissions (up to 24h) of the materials specified above will result in a penalty of 50% on the grade assigned to the corresponding activity. Submissions after 24h from the specified deadline will receive **ZERO** marks.
- Late submission of the student's preferences for paper presentations will result in the assignment of a paper selected by the instructor.
- Projects whose topic is not approved by the instructor by **June 12, 2025** will receive **ZERO** marks.
- The guidelines for the preparation and submission of the course materials listed above are indicated in respective instruction documents available (or to be made available) in the course website under "Handouts".
- The instructor reserves the right, where appropriate, to adjust raw marks downward in the case of any **violation of academic integrity** (please refer to the section **University Mandatory Information** below) and upward in other situations.
- Marking issues will not be discussed via email. Students should attend the instructor's office hours to clarify any aspect related to the their marks.

Paper Assignment Process

- Students will present at most two papers (from the list of papers available in the course website under "Selected Papers") during this term. The paper presentations will be divided in two rounds.
- For each round of paper presentations, students can indicate three papers that they would like to present in decreasing order of preference. The instructor will assign papers to the students on a first come first serve basis taking into account their preferences. However, if all three papers chosen by a student have already been assigned to other students, the instructor will assign another paper from the list of papers. The paper assignments made by the instructor will be announced via email and Learn.
- **Students should submit their three paper choices to the instructor via email using his email address (gvgbaran@gmail.com) and the subject "CS898: Paper-Preferences" by the due date specified in the course schedule available in course website under "Handouts". After that deadline, their preferences may not be considered during the paper assignment process.**

Course Work and Integrity Policies

- **All course materials should be prepared and submitted individually, with the exception of project overview, presentation and written report since the project can be carry out by teams of two students.**
- **GenAI Forbidden**: This course includes the independent development and practice of specific skills, such as the writing of paper commentaries and project written report. Therefore, the use of Generative artificial intelligence (GenAI) trained using large language models (LLM) or other methods to produce text, images, music, or code, like Chat GPT, DALL-E, or GitHub CoPilot, is not permitted in this class. Unauthorized use in this course, such as running course materials through GenAI or using GenAI to complete a course assessment is considered a violation of Policy 71 (plagiarism or unauthorized aids or assistance: *www.adm.uwaterloo.ca/infosec/Policies/policy*71.*htm*).

  Students should be prepared to show their work. To demonstrate your learning, students should keep their rough notes, including sources, research notes, brainstorming, drafting notes and prompts. Students may be asked to submit these notes along with earlier drafts of their work, either through saved drafts or saved versions of a document. If the use of GenAI is suspected where not permitted, students may be asked to meet with the instructor to provide explanations to support the submitted material as being their original work. If students cannot sufficiently support their work, academic misconduct allegations may be brought to the Associate Dean.

- All password protected materials available on the course website are intended for the exclusive academic use of students enrolled in this offering (Spring 2025) of CS898. Accordingly, these materials should not be distributed by the students to people not enrolled in the course.
- The instructor will provide students with temporary passwords in the first week of classes. During the term, these passwords will be changed for security reasons. The instructor will then provide the new passwords for the students enrolled in the course. Students should not share course passwords with people not enrolled in the course during this term.
- Any breach of these guidelines will be considered a **violation of academic integrity**, and it will be dealt with according to the university procedures described in Policy 71, Student Discipline, *www.adm.uwaterloo.ca/infosec/Policies/policy*71.*htm*.

Course Delivery Policies

- Students should note that the course schedule and the other supplementary documents available in the course website under "Handouts" may be subjected to change during the term. In that case, the instructor will inform the students about such changes in class and via email/Learn, and release revised versions of the respective documents in the course website under "Handouts".
- All announcements from the course instructor will be provided in class and via email/Learn. It is the students' responsibility to ensure that they are up-to-date on these announcements.
- During this term, the instructors' office hours will be be held in the instructor's office (DC3520), between 11:30-12:30PM on Tuesday.
- General questions about the contents of this course outline or the other available handouts should be directed to the instructor via email with the subject "CS898: Handout Question" within the first three weeks of classes. If a question requires a detailed answer (more than two lines), then the instructor will tell the student to attend his office hours.
- Use the course instructor's email for specific issues related to course materials and activities. Issues requiring detailed answers should be addressed during the instructors office hours. Email messages that do not follow the instructions outlined above will **not** be answered by the instructor.
- In case of a special hardware or software issue preventing a student to submit a course material by its due date, the student must contact the instructor at least 24h before that deadline.
- In case of a medical issue preventing a student to submit a course material by its due date, the student should promptly notify the course instructor and provide the appropriate documentation.

- Students that enrol in the course after **May 15** should contact the course instructor no later than **May 22**. Otherwise, they will automatically received **ZERO** marks for any missing course activity.

Continuity Plans

- In case of a short-term or long-term cancellation of in-person classes, all the the activities listed in the course schedule will remain the same, with the same deadlines. The instructor will use the course website to provide course updates and announcements about the students' weekly activities. These updates and announcements will be delivered primarily on the days originally assigned to the lectures, namely Tuesday and Thursday.

- In case of a short-term or long-term cancellation of in-person meetings, the instructor will hold virtual office hours (VOH), with instructions (for registration and participation) provide in the course website under "Handouts".

University Mandatory Information

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check *www.uwaterloo.ca/academicintegrity/* for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, *www.adm.uwaterloo.ca/infosec/Policies/policy*70.*htm*. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity [check *www.uwaterloo.ca/academicintegrity/*] to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about 'rules' for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, *www.adm.uwaterloo.ca/infosec/Policies/policy*71.*htm*. For typical penalties check Guidelines for the Assessment of Penalties, at the following web site *www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm*.

Appeals: A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) *www.adm.uwaterloo.ca/infosec/Policies/policy*72.*htm*.

Note for Students with Disabilities: The AccessAbility Services Office (AAS), located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AAS at the beginning of each academic term.

Additional Information

- **Intellectual Property**: Students should be aware that this course contains the intellectual property of their instructor, TA, and/or the University of Waterloo. Intellectual property includes items such as:

  - Lecture content, spoken and written (and any audio/video recording thereof);
  - Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides);
  - Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams);
  - Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).
  - Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

  Permission from an instructor, TA or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights.

  Please alert the instructor if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know (and may have already given their consent).

- **Mental Health:** If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support.

On-campus Resources:

- Campus Wellness `https://uwaterloo.ca/campus-wellness/`;
- Counselling Services: `counselling.services@uwaterloo.ca`, phone: 519-888-4567 ext. 32655, Needles Hall North 2nd floor, (NH 2401);
- MATES: one-to-one peer support program offered by Federation of Students (FEDS) and Counselling Services: `mates@uwaterloo.ca`;
- Health Services service: located across the creek from Student Life Centre, phone: 519-888-4096.

Off-campus Resources:

- Good2Talk (24/7): Free confidential help line for post-secondary students. phone: 1-866-925-5454;
- Here 24/7: Mental Health and Crisis Service Team. Phone: 1-844-437-3247;
- OK2BME: set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Phone: 519-884-0000 ext. 213.

- **Diversity**: It is our intent that students from all diverse backgrounds and perspectives be well served by this course, and that students' learning needs be addressed both in and out of class. We recognize the immense value of the diversity in identities, perspectives, and contributions that students bring, and the benefit it has on our educational environment. Your suggestions are encouraged and appreciated. Please let us know ways to improve the effectiveness of the course for you personally or for other students or student groups. In particular:
  - We will gladly honour your request to address you by an alternate/preferred name or gender pronoun. Please advise us of this preference early in the semester so we may make appropriate changes to our records.
  - We will honour your religious holidays and celebrations. Please inform of us these at the start of the course.
  - We will follow AccessAbility Services guidelines and protocols on how to best support students with different learning needs.