

DS 4999Z Project in Data Science Course Outline

1. Course Information

Course Information

Academic Term: Annual 2022/23

The course does not follow a weekly schedule. You are expected to meet periodically with your supervisor and there will be specific presentations sessions during the year to receive feedback from other students and the course coordinators. These sessions will be set during the year depending on availability of the coordinators, the supervisors and the students.

List of Prerequisites

Registration in the fourth year of the Honours Specialization in Data Science. Students must have a modular course average of at least 80% and must find a faculty member to supervise the project. If you do not have a Western professor with whom to do your projects, we will be offering some projects during the first weeks of the course, although ultimately the responsibility of securing a supervisor will fall on the students.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

List of Anti-requisites

Computer Science 3380F/G/Z, Computer Science 4460Z, Computer Science 4480Y, Computer Science 4470Y, Computer Science 4490Z, Statistical Science 4999F/G/Z, Actuarial Sciences 4997F/G/Z, Financial Modelling 4998F/G/Z.

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr. Holly Steeves (Course Coordinator)	holly.steeves@uwo.ca	WSC 233	519-661-2111 ext. 86426	MF 10:00 – 11:00 T 2:00 – 3:00

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

3. Course Syllabus, Schedule, Delivery Mode

The student will work on a project under faculty supervision. The project may involve an extension, or more detailed coverage, of material presented in other courses. Credit for the course will involve a written report in paper format as well as a series of oral presentations at different stages of the process.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- Create a research question / hypothesis and a solution methodology for a problem in the Statistical or Data Sciences that is feasible, well-defined, specific, and relevant.
- Synthesize the existing literature to position the research in the overall context of its field.
- Deploy Statistical / Data Science methodologies to solve the research question / test the hypothesis using relevant software.
- Analyse and interpret the results of their work to arrive at actionable conclusions.
- Communicate and illustrate the preliminary and final results of the work effectively via oral presentations.
- Generate a written report in scientific paper format following the scientific standards of the selected research field.

Only a few weeks in the semester will have scheduled activities. Students are strongly encouraged to set periodical (we suggest either bi-weekly or weekly, with a minimum of once every four weeks) meetings with their respective supervisors.

Classes begin: September 8, 2022; January 9, 2023

Fall Reading Week: October 31 – November 6, 2022; February 18 – 26, 2023

Classes end: December 8, 2022; April 10, 2023

Final presentations will be conducted in person (room number to be confirmed).

Contingency plan for an in-person class pivoting to 100% online learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

4. Course Materials

Recommended bibliography:

- Day, R. A., & Gastel, B. (1990) *How to write and publish a scientific paper*. Cambridge University Press.
- Lones, M. (2021) How to avoid machine learning pitfalls: a guide for academic researchers. *arXiv preprint arXiv:2108.02497*. Available online here: <https://arxiv.org/abs/2108.02497>
- Nickerson, E. T. (1993). *The dissertation handbook: A guide to successful dissertations*. Kendall Hunt Publishing Company.

- Pautasso, M. (2013). Ten simple rules for writing a literature review. *PLoS computational biology*, 9(7), e1003149. Available online here: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3715443/>

Students are responsible for checking the course OWL site (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

All course material will be posted to OWL: <http://owl.uwo.ca>.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Technical Requirements

A notebook with internet access is required.

5. Methods of Evaluation

The overall course grade will be calculated as listed below:

Reports (3)	65 %
Presentations (3)	35 %

The course includes the following activities:

Project Proposal

The project proposal stage is focused in designing the research question / hypothesis to tackle and placing it in the context of the literature review. During the first month, students will work with their supervisors defining the problem to work on during the thesis year. After the problem has been agreed, these activities follow:

- General problem presentation (Week 4, 5% of final grade): In this week, the students will present the research question / hypothesis to tackle, the motivation for the problem (why it is important) and a skeleton methodology (vignettes with what techniques to explore, what data to use, etc). The presentation should last no more than 15 minutes with 5 minutes for questions.
- Project proposal report (Week 6, Deadline in OWL, 10% of final grade, marked by supervisor): Project report of maximum 2000 words including:
 - Title.
 - Tentative abstract.
 - Introduction discussing the motivation of the problem, the research questions and hypothesis, an introduction to the methodology used and why it was selected and a plan for the paper structure.
 - Literature review draft with the main works in the area within the context of the paper.
 - Methodology skeleton (vignette list with plan).
 - Gantt chart planning the work.

Preliminary Results Report

- Presentation (worth 15% of the final grade): Students will present their final problem and Research Questions / Hypotheses, the final literature review and how their research is placed within the context of the literature, and the methodology proposal.
- Preliminary results report (worth 20% of the final grade. Deadline Week 8 of the Winter semester). This section includes a report with the preliminary results, a report, marked by the supervisor, up to 8000 words including:
 - Title.
 - Final abstract proposal
 - Introduction discussing the motivation of the problem, the research questions and hypothesis, an introduction to the methodology used and why it was selected, and the final paper structure.
 - Literature review.
 - Methodology.
 - Data description.
 - Experimental setting and preliminary results.
 - Conclusions draft.

Final Report and Final Presentation

- Final Presentation: The last stage of the course includes the final presentation of the thesis and the final report. The final presentation is a 20-minute presentation of the project which must include all topics covered. The presentation will occur during the exam period of the Winter semester and is worth 15% of the final grade.
- The final presentation will be followed by the final thesis (worth 35% of the final mark), a document in paper format of between 5,000 and 10,000 words. The paper must include the following sections (or similar alternatives if appropriate):
 - Title.
 - Abstract
 - Introduction discussing the motivation of the problem, the research questions and hypothesis, an introduction to the methodology used and why it was selected, and the final paper structure.
 - Literature review.
 - Methodology.
 - Data description if applicable.
 - Experimental setting
 - Results and discussion (or a separate discussion section if appropriate).
 - Conclusions and future work.

This paper will be marked by the supervisor and another supervisor of a different student. In case there is more than 15%-mark difference, a third member will be invited to moderate the mark. Otherwise, the mark of the report will be the average between the two reviewers' marks.

Conditions to pass the course

- Students who are unable to secure a project by the submission of the report (second week of October) **will be eliminated from the course.**
- As this is an essay course, the written part of the course must be approved with mark over 50%. Students who do not reach that mark will fail the course independently of the mark in the presentation component of the course.

Accommodated Evaluations

Attendance to all presentation sessions is mandatory and all deadlines are final. In case of excused absences due to illnesses or other excused situations, an alternative date will be agreed for presentations. For report submissions, the deadline for the report will be 24 hours after the last excused absence.

Unexcused late submissions will be subject to a late penalty of 20% per day, starting at 00:00 the day after the submission date.

6. Student Absences

Academic Consideration for Student Absences

Students who experience an extenuating circumstance (illness, injury or other extenuating circumstance) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes:

- (i) For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner to the Academic Counselling office of their Faculty of Registration.
- (ii) Submitting appropriate documentation for non-medical absences to the Academic Counselling office in their Faculty of Registration.

Note that in all cases, students are required to contact their instructors within 24 hours of the end of the period covered, unless otherwise instructed in the course outline.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences must be submitted to the Academic Counselling office of a student's Home Faculty.**

For the policy on Academic Consideration for Student Absences – Undergraduate Students in First Entry Programs, see:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf

and for the Student Medical Certificate (SMC), see:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

6. Accommodation and Accessibility

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf.

7. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual’s official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

8. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (<http://www.health.uwo.ca/mentalhealth>) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.