

## **Introduction to Data Science**

### **MOS 3335A Section 550 (Fall 2022)**

**Instructor:** Aria Teimourzadeh, PhD

**E-mail address:** [ateimour@uwo.ca](mailto:ateimour@uwo.ca)

**Course schedule:** Monday 12:30 PM to 2:30 PM and Wednesday 1:30 PM to 2:30 PM

**Classroom:** H-221 (Frank Holmes Centre - new building)

**Office hours:** By appointment (In-person or Zoom)

---

#### **COURSE DESCRIPTION:**

Data science is the field of study that combines domain expertise, programming skills, and knowledge of mathematics and statistics to extract meaningful insights from data. This course will focus on simultaneously teaching introductory skills needed to collaborate on teams with data scientists, analysts, and other information professionals. Topics include: Database Management, Data Science methods in R/Python, Data Visualization techniques, Machine Learning technique case studies, critical Topics in Big Data and Emerging AI Technologies.

**Course Prerequisite(s):** MOS 2242A/B, or taken concurrently with MOS 2242A

#### **COURSE LEARNING OBJECTIVES**

As a result of this course, students will be able to:

- Build and manage a database
- Develop interdisciplinary skills on how to integrate critical and creative thinking with examples from computational tools.
- Apply analytical techniques to datasets to produce insights for decision making.

#### **DESCRIPTION OF CLASS METHODS**

This course is heavily based on experiential learning activities, providing the students with an environment where they can improve their statistical literacy and interpretation skills in practice using powerful tools and programming languages. The course materials including instructions, PPT slides and exercise files will be uploaded in advance. The students are expected to follow the instructions posted on the course website to submit their weekly assignments before each deadline.

© Instructor generated course materials (e.g., any video, slides, instructions, notes, summaries, exam questions, etc.) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor. Note that infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.

## TEXTBOOKS AND OTHER REQUIRED RESOURCES

Textbook No textbook is required; readings will be assigned from instructor generated material, software documentation and free online resources. However, access to a laptop that has an operating system of Windows 10, Mac OS X, or any common Linux distribution is required. Students will be required to code in Python.

Course Notes and data files To be found on the course website at <https://owl.uwo.ca>.

## METHOD OF EVALUATION/ASSESSMENT

Weekly Assignments	20%
Midterm Exam	31%
Quiz	14%
Group Assignment	35%

NOTE: The content and/or evaluation scheme in this course is subject to change.

## SPECIAL INSTRUCTIONS, IF ANY

Students must pay attention to e-mails and announcements in OWL related to the special assignment/reading/exercises.

## COURSE POLICIES

### ➤ Assignments & tests

- Always make sure you have a backup of your assignments and of your tests.
- Late submissions **will not be accepted** and **no mark will be given** after the deadlines.
- If you are not satisfied with the grading of an assignment or test, you may request a review **within 1 week of grade posting**.
  - Indicate in writing where and why you feel the marks are unjustified and give it back to the instructor for re-grading.
  - Note that the entire assignment will be re-graded and your grade can go up or down (or stay the same).

If you are to miss a test, you must report this as soon as possible to your instructor. It will be up to the instructor to decide an appropriate course of action.

## TENTATIVE SCHEDULE OF CLASSES.

- This schedule and some topics may change – updates are posted to OWL.

Week	Dates	Topic
1	Sept 12 and Sept 14	Introduction to Data Science, Data Science Tasks, Supervised Learning and Unsupervised Learning
2	Sept 19 and Sept 21	Understanding Data Structures, Entities, Relationships and ER diagrams
3	Sept 26 and Sept 28	Data Manipulation using SQL (DML) In a Business Context
4	Oct 3 and Oct 5	Data Definition using SQL (DDL) In a Business Context
5	Oct 12	Advanced Statistical Analysis and Data Visualization using Tableau
6	Oct 17 and Oct 19	Advanced Statistical Analysis and Data Visualization using Tableau (continued)
7	Oct 24 and Oct 26	Review, Midterm Week <b>Midterm exam: Monday, October 24<sup>th</sup> from 12:30 PM to 2:30 PM</b>
Fall Reading Week : October 31, 2022 to November 6, 2022		
8	Nov 7 and Nov 9	Clustering, Linear regression and Correlations, Correlation Matrix, Forecasting
9	Nov 14 and Nov 16	Introduction to Python (Basic operations, Data Cleaning and Scientific Computation)
10	Nov 21 and Nov 23	Python for Data Science (Probability and Hypothesis Testing) <b>Quiz : Wednesday, November 23<sup>rd</sup> from 1:30 PM to 2:30 PM</b>
11	Nov 28 and Nov 30	Python for Data Science (Predictive methods, Data Visualization using Matplotlib and Seaborn)
12	Dec 5 and Dec 7	Group Presentations

## UNIVERSITY RESOURCES

The website for the Office of the Registrar is <http://www.registrar.uwo.ca>. Students may also wish to contact Student Development Services at <http://www.sdc.uwo.ca>.



## **Appendix to Course Outlines: Academic Policies & Regulations Fall/Winter 2022**

### **Pandemic Contingency**

Huron will continue to follow the guidance of public health and government officials. It is anticipated that there will be no further disruptions to in-person instruction. This is subject to change.

### **Student Code of Conduct**

Membership in the community of Huron University College and Western University implies acceptance by every student of the principle of respect for the rights, responsibilities, dignity and well-being of others and a readiness to support an environment conducive to the intellectual and personal growth of all who study, work and live within it. Upon registration, students assume the responsibilities that such registration entails. While in the physical or online classroom, students are expected to behave in a manner that supports the learning environment of others. Please review the Student Code of Conduct at:

<https://huronatwestern.ca/sites/default/files/Res%20Life/Student%20Code%20of%20Conduct%20-%20Revised%20September%202019.pdf>.

### **Prerequisite and Antirequisite Information**

Students are responsible for ensuring that they have successfully completed all course prerequisites and that they have not completed any course antirequisites. 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.

### **Attendance Regulations for Examinations**

A student is entitled to be examined in courses in which registration is maintained, subject to the following limitations:

- 1) A student may be debarred from writing the final examination for failure to maintain satisfactory academic standing throughout the year.
- 2) Any student who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course will be reported to the Dean of the Faculty offering the course (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean of that Faculty, the student will be debarred from taking the regular examination in the course. The Dean of the Faculty offering the course will communicate that decision to the Dean of the Faculty of registration.

Review the policy on Attendance Regulations for Examinations here: [Academic Calendar - Western University \(uwo.ca\)](#)

### **Statement on Academic Offences**

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 website:

[Academic Calendar - Western University \(uwo.ca\)](#) .The appeals process is also outlined in this policy as well as more generally at the following website:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/appealsundergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/appealsundergrad.pdf).

### **Turnitin.com**

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>).

### **Statement on Use of Electronic Devices**

It is not appropriate to use electronic devices (such as, but not limited to, laptops, tablets, cell phones) in the classroom for non-classroom activities. Such activity is disruptive and distracting to other students and to the instructor, and can inhibit learning. Students are expected to respect the classroom environment and to refrain from inappropriate use of technology and other electronic devices in class.

### **Statement on Use of Personal Response Systems (“Clickers”)**

Personal Response Systems (“clickers”) may be used in some classes. If clickers are to be used in a class, it is the responsibility of the student to ensure that the device is activated and functional. Students must see their instructor if they have any concerns about whether the clicker is malfunctioning. Students must use only their own clicker. If clicker records are used to compute a portion of the course grade:

- the use of somebody else’s clicker in class constitutes a scholastic offence
- the possession of a clicker belonging to another student will be interpreted as an attempt to commit a scholastic offence.

### **Academic Consideration for Missed Work**

All students pursuing academic consideration, regardless of type, must contact their instructors no less than 24 hours following the end of the period of absence to clarify how they will be expected to fulfill the academic responsibilities missed during their absence. **Students are reminded that they should consider carefully the implications of postponing tests or midterm exams or delaying submission of work, and are encouraged to make appropriate decisions based on their specific circumstances.**

Students who have conditions for which academic accommodation is appropriate, such as disabilities or ongoing or chronic health conditions, should work with Accessible Education Services to determine appropriate forms of accommodation. Further details concerning policies and procedures may be found at: <http://academicsupport.uwo.ca/>.

### **Policy on Academic Consideration for a Medical/ Non-Medical Absence**

**(a) Consideration on Medical Grounds for assignments worth *less than 10%* of final grade: Consult Instructor Directly and Contact Academic Advising**

When seeking consideration on **medical grounds** for assignments worth *less than 10%* of the final course grade, the student should contact the instructor directly. The student need only share broad outlines of the medical situation. The instructor **may** require the student to submit documentation to

the academic advisors, in which case she or he will advise the student and inform the academic advisors to expect documentation. If documentation is requested, the student will need to complete and submit the [Student Medical Certificate](#). The instructor may not collect medical documentation. The advisors will contact the instructor when the medical documentation is received, and will outline the severity and duration of the medical challenge as expressed on the Student Medical Certificate and in any other supporting documentation. The student will be informed that the instructor has been notified of the presence of medical documentation, and will be instructed to work as quickly as possible with the instructor on an agreement for accommodation.

**b) Medical Grounds for assignments worth 10% or more of final grade: Go Directly to Academic Advising**

University Senate policy, which can be found at [Academic Calendar - Western University \(uwo.ca\)](#) requires that all student requests for accommodation on medical grounds for assignments worth 10% or more of the final grade be made directly to the academic advising office of the home faculty (for Huron students, the “home faculty” is Huron), with supporting documentation in the form (minimally) of the Senate-approved Student Medical Certificate found at: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf).

The documentation is submitted in confidence and will not be shown to instructors. The advisors will contact the instructor when the medical documentation is received, and will outline the severity and duration of the medical challenge as expressed on the Student Medical Certificate and in any other supporting documentation. The student will be informed that the instructor has been notified of the presence of medical documentation, and will be instructed to work as quickly as possible with the instructor on an agreement for accommodation. The instructor will not normally deny accommodation where appropriate medical documentation is in place and where the duration it describes aligns with the due date(s) of assignment(s). Before denying a request for accommodation on medical grounds, the instructor will consult with the Dean. The instructor’s decision is appealable to the Dean.

**c) Consideration on Non-Medical Grounds: Consult Huron Support Services/Academic Advising, or email [huronsss@uwo.ca](mailto:huronsss@uwo.ca).**

Students seeking academic consideration for a **non-medical** absence (e.g. varsity sports, religious, compassionate, or bereavement) will be required to provide appropriate documentation. All consideration requests must include a completed [Consideration Request Form](#). Late penalties may apply at the discretion of the instructor.

Please review the full policy on Academic Consideration for medical and non-medical absence at: [accommodation\\_medical.pdf \(uwo.ca\)](#). Consult [Huron Academic Advising](#) at [huronsss@uwo.ca](mailto:huronsss@uwo.ca) for any further questions or information.

**Support Services**

For advice on course selections, degree requirements, and for assistance with requests for medical accommodation, students should email an Academic Advisor in Huron’s Student Support Services at [huronsss@uwo.ca](mailto:huronsss@uwo.ca). An outline of the range of services offered is found on the Huron website at: <https://huronatwestern.ca/student-life/student-services/>.

Department Chairs, Program Directors and Coordinators are also able to answer questions about individual programs. Contact information can be found on the Huron website at: <https://huronatwestern.ca/contact/faculty-staff-directory/>.

If you think that you are too far behind to catch up or that your workload is not manageable, you should consult your Academic Advisor. If you are considering reducing your workload by dropping one or more courses, this must be done by the appropriate deadlines. Please refer to the Advising website, <https://huronatwestern.ca/student-life/student-services/academic-advising/> or review the list of official Sessional Dates on the Academic Calendar, available here: <http://www.westerncalendar.uwo.ca/SessionalDates.cfm>.

You should consult with the course instructor and the Academic Advisor who can help you consider alternatives to dropping one or more courses. Note that dropping a course may affect OSAP and/or Scholarship/Bursary eligibility.

Huron Student Support Services: <https://huronatwestern.ca/student-life/student-services/>  
Office of the Registrar: <https://registrar.uwo.ca/>  
Student Quick Reference Guide: <https://huronatwestern.ca/student-life/student-services/#1>  
Academic Support & Engagement: <http://academicsupport.uwo.ca/>  
Huron University College Student Council: <https://huronatwestern.ca/student-life/beyond-classroom/hucsc/>  
Western USC: <http://westernusc.ca/your-services/#studentservices>

### **Wellness and Health Supports at Huron and Western**

University students may encounter setbacks from time to time that can impact academic performance. Huron offers a variety of services that are here to support your success and wellbeing. All Huron staff and faculty have received training on responding to disclosures of Gender-Based Sexual Violence (GBSV); students should know that the Community Safety Office is a resource for survivors, providing support and, if desired, guidance while referring them to the further supports that they may require. Please visit <https://huronatwestern.ca/student-life-campus/student-services/wellness-safety> for more information or contact staff directly:

Wellness Services: [huronwellness@huron.uwo.ca](mailto:huronwellness@huron.uwo.ca)  
Community Safety Office: [safety@huron.uwo.ca](mailto:safety@huron.uwo.ca)  
Additional supports for Health and Wellness may be found and accessed at Western through, <https://www.uwo.ca/health/>.

Western Calendar - Policy Pages -

[Academic Calendar - Western University \(uwo.ca\)](#)