Western Science

Department of Mathematics

Course Outline
DS2100: Mathematics for Data Science

1. Course Information

Course Information

DS2100: Mathematics for Data Science, Fall 2021
MWF 1:30-2:30 PM (lecture, WIRB 1170)
Tuesday 1:30-2:30 PM (tutorial, UCC41)

List of Prerequisites

1.0 courses from Mathematics, Calculus, or Applied Mathematics (1000 and higher) with a minimal grade of 60%. Data Science 2000A/B or Integrated Science 2002B can be used to fulfil 0.5 of the requirements.

Antirequisites: Mathematics 1600A/B, Applied Mathematics 1411A/B.

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr. Lyle Muller	lmuller2@uwo.ca	WIRB4168	x88790	Tu 2:30-4:30

3. Course Syllabus, Schedule, Delivery Mode

Mathematical background for students wanting to take Data Science 3000A/B, but missing background in linear algebra and calculus. Vector and matrix algebra, norms, linear dependence, inverses, vector spaces, eigenvectors and eigenvalues, Gradients, Hessians, basics of optimization. All concepts are explained in the context of data science examples.

Course Schedule

Week	Topic
Week 1	Mathematics for Data Science
Week 2	Basic differentiation and integration

Week	Topic
Week 3	Extrema, partial derivatives, and gradients
Week 4	Introductory statistics and probability
Week 5	Common probability distributions
Week 6	*Midterm*
Week 7	Scalars, vectors, and matrices
Week 8	Linear transformations
Week 9	*Reading week*
Week 10	Systems of linear equations
Week 11	Eigenspectra
Week 12	Singular Value Decomposition
Week 13	*Final*

Contingency plan for 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

The textbook for this course is Essential Math for Data Science (Hadrien Jean). Each week will have an assignment to be completed and submitted online. Students will be responsible for checking the course website on a regular basis for announcements and updates. This is the primary method by which information will be disseminated to all students in the class. We will also make a Slack channel available for discussions and interaction with the teaching team.

Technical Requirements

All programming and math problems in this course will be provided through Trinket. We will use this platform to simulate the concepts underlying mathematical concepts in short code segments and also to provide assessments (problem sets and exams). An introduction to the platform will be provided in the first week of class.

5. Methods of Evaluation

The overall course grade will be calculated as listed below:
Assignments (#) 25%
Midterm Test 25%

Final Exam 50%

The Midterm will be held during the sixth week of the course (13 October).

Accommodated Evaluations

Late submissions will receive a deduction of 10% per day after the initial deadline. If a scheduled exam is missed due to an excused absence, an alternate assessment will be provided.

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) Submitting a Self-Reported Absence (SRA) form provided that the conditions for submission are met. To be eligible for a Self-Reported Absence:

- an absence must be no more than 48 hours
- the assessments must be worth no more than 30% of the student's final grade
- no more than two SRAs may be submitted during the Fall/Winter term

(ii) 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.

(iii) 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 that are not covered by the Self-Reported Absence Policy 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 work with Accessible Education (formerly SSD), 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.

Laptops will be used for part of the midterm and final exams; otherwise, laptops and calculators will not be permitted. Students will receive clear indication for laptop use in each section.

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). Programming assignments may be checked for similarity using MOSS (Measure of Software Similarity).

Tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

https://remoteproctoring.uwo.ca.

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/.

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.