

1. General Course Information

Course Information

INTRODUCTION TO DATA SCIENCE I
CS4414B/CS9637B/CS9114B
Winter 2020

Lecture: Monday 12:30pm to 2:30pm (NCB 114)
Lecture / Lab: Wednesday 2:30pm to 4:30pm (HSB 236)

Prerequisites

There are no set prerequisites for the class. However, a decent working knowledge of probability, linear algebra, and basic programming in Python is required. A more detailed self-assessment on whether students have the required background is available at:

<https://www.csd.uwo.ca/~dlizotte/teaching/IDS/index.html>

2. Instructor Information

Jörn Diedrichsen, Professor
Western Interdisciplinary Research Building 4138
Dan Lizotte, Assistant Professor
Middlesex College MC363 | Kresge Building K3D

Students must make contact by OWL message. In the case of a general question, students should check the OWL forum first for an answer and then post the question to the OWL forum.

3. Course Description/Syllabus

Introduces machine learning and statistical methods for data analysis through applied examples. Particular emphasis is placed on how to rigorously evaluate an analysis of data.

The first half of the class covers the most important principles in data science:

- Supervised learning and model fitting
- Probabilistic foundations of machine learning
- Estimating performance and quantifying uncertainty
- Model selection, cross-validation, and regularisation
- Hypotheses, Randomization, and Inference

The second half of the class then introduces a selection of current techniques:

- Classification and Logistic regression
- Support Vector machines and other kernel methods
- Artificial Neural Networks

- Clustering
- Trees
- Dimensionality reduction

4. Course Materials

Lecture Slides

Lecture slides will be available on OWL.

Recommended Texts

HTF: *The Elements of Statistical Learning* by Hastie, Tibshirani and Friedman. [**Free online**]

MLPP: Machine Learning: a Probabilistic Perspective by Kevin P. Murphy [**Free online**]

Students must check OWL (<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. Students are responsible for checking OWL on a regular basis.

5. Methods of Evaluation

The overall course grade will be calculated as listed below:

Graduate

- Weekly Assignments - 50%
- Midterm - 20%
- Data Science Project - 30%

Undergraduate

- Weekly Assignments - 50%
- Midterm - 25%
- Final Exam - 25%

For Undergraduates and Graduates:

Weekly Assignment:

Assignments will be released after each Monday lecture, with due dates of the following Monday at 9am, unless otherwise specified. No late Assignments will be accepted, but will be graded with 0%. The Assignment with the lowest grade will be dropped for every student. Therefore, no special accommodation for a single missed assignment will be given.

Midterm:

The midterm exam will be held during lab on Wednesday, 12th of February, 14:30pm to 16:30pm in HSB 236. The midterm will cover concepts up to and including those covered up to this point. The midterm will be a practical examination; each student will need a laptop to complete the midterm. Students will be given a data set and a set of practical data analytic problems to solve, similar to the structure of the weekly assignments. The exam is “open book & open web”, meaning that students can

access any notes or any documents on the web. Electronic communication with other people inside or outside the classroom are prohibited.

A grade of 50% or higher on the midterm is required to write the final examination (undergraduates) or to submit the final project (graduates).

For Undergraduates:

The final exam will be scheduled by the Registrar. The final exam will cover concepts from the entire course and is in structure similar to the midterm exam. A grade of 50% or higher on the final examination is required to pass the course. The midterm will be a practical examination; each student will need a laptop to complete the midterm.

For Graduates:

The final project is due at 5pm on 9th of April and must be submitted via OWL.

6. Accommodation and Accessibility

Note that if documentation (medical or otherwise) is required, it can only be collected by the student's Dean's Office/Academic Counselling unit.

If you are unable to meet a course requirement due to illness or other serious circumstances, you must seek approval for the absence as soon as possible. Approval can be granted either through a self-reporting of absence or via the Dean's Office/Academic Counselling unit of your Home Faculty. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at scibmsac@uwo.ca.

For further information, please consult the university's policy on academic consideration for student absences:

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

If a student has received academic accommodation, missed components are excused so that the course is reweighted.

For accommodation for work worth 10% or less of the final grade, the student is referred to the student's Dean's Office/Academic Counselling unit.

If you miss the Final Exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (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" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

7. Academic Policies

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

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html> 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.

On the midterm and exam, students are allowed to use any document and source on their computer and look up documents on the internet. *However they are not allowed to share documents, or communicate in any other way with people inside or outside the class room during the test.*

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 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 Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations.

The policy on Accommodation for Students with Disabilities can be found here: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf

The policy on Accommodation for Religious Holidays can be found here: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

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/mental_health) 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>.