

CS2035 - Data Analysis and Visualization

What is this course about?

Being able to analyze large and complex data sets is a skill sought after in many industries and academic fields. The management and analysis of such data sets often requires the use of a programming language to create in-depth and customized analysis (mainstream spreadsheet software like Excel, GoogleSheets, etc. are often limited)

This course will introduce basic programming skills to manage, visualize and analyze data. Data analysis will use simple statistical methods.

The programming language for this course is [Matlab](#), but many of the skills acquired will be transferable to other programming languages (like Python, R, etc.). This course assumes no prior programming knowledge (although some knowledge of programming in general would be helpful). Matlab, like most of [high-level programming languages](#), lets you start programming right away, with just some rudimentary knowledge.

Prerequisites

The prerequisites for this course are: 1.0 courses in Applied Mathematics, Calculus, Mathematics, Statistics (including Introductory Statistics), or the former Linear Algebra, or permission of the Department/Instructor. Beware of the following Dean's rule:

"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."

Locations and Meeting Times

There are two 75-minute classes each week, as well as two labs on Mondays (you only have to attend the *one* lab session you are registered for):

Type	Day of the week	Time	Location
Lab	Monday	2:30 - 3:30 PM	HSB 14
Lab	Monday	3:30 - 4:30 PM	HSB 16
Class	Tuesday	12:30 - 2:00 PM	HSB 236
Class	Thursday	3:30 - 5:00 PM	HSB 236
Office hours	TBA	TBA	TBA

The first day of classes will be on **Tuesday, January 7th, 2020**.

Instructor and Teaching Assistants

Role	Name	Email
Instructor	Dr. David Champredon	dchampre@uwo.ca
Teach. Assist.	TBA	TBA
Teach. Assist.	TBA	TBA

Course Syllabus

Order of topics within a part may change at the instructor's discretion.

Part 1: Introduction to Programming with Matlab

- Introduction to the Matlab environment
- Data types
- Control flow (loops, while, if-then-else, switch, etc.)
- Scripts and functions
- Simple input/output (reading/writing files with various format)
- Arrays and matrix algebra
- Serialization versus Vectorization
- Random number generation
- Object Oriented MatLab
- Creating simple Graphical User Interfaces (GUIs)

Part 2: Basic Data Visualization

- Plotting functions in 2 and 3 dimensions
- Plotting data
- Plotting to prepare a statistical analysis

Part 3: Basic Data Analysis

- Basic statistical operations
- Hypothesis testing
- Regression analysis

Course Material

Obtaining MatLab

As a Western student, you are entitled to install a free copy of the MATLAB software on your computer. The software is available at <http://software.uwo.ca>. For information on how install MATLAB on your personal computing device see <https://wts.uwo.ca/sitelicense/matlab/activation.html>.

Textbooks

I will not follow a specific textbook. **Any MATLAB textbook would mostly like be sufficient.**

Good books:

Mastering MATLAB, Duane Hanselmann and Bruce Littlefield, Pearson (Prentice Hall), 2012.

MATLAB Programming for Engineers (5 th edition), Stephen J. Chapman, Cengage Learning, 2016

All MATLAB toolboxes are [fully documented](#). Mathworks offers a number of Webinars on various topics on www.mathworks.com. Mathworks also offers online documentation, discussion forums, and numerous other resources.

Last but not least, web search engines (Google, DuckDuckGo, etc.) can find just about anything to do with MATLAB!

Lecture Notes

The course notes and some MATLAB scripts and data will be on the [course webpage](#).

Methods of Evaluation

Overall Grading Weights

Type	Weight
Labs	8%
Assignments	32%
Mid-term	20%
Final Exam	40%

Labs

Each lab must be submitted by Friday, 11:55pm, via Owl in the week of that lab.

In addition, you **must** attend the lab and sign the attendance sheet (photo id is required). Failure to do both will result in a grade of 0 for that lab. Ideally, you should be able to complete the lab during the lab time and submit it via Owl at the end of the lab.

You must attend the lab session for which you are registered. There are no make-up labs and students who are absent from a lab do **not** have the option of just submitting the lab online via OWL: attendance is required.

There are 11 labs but you only have to attend 8 to obtain full marks (1 lab = 1%). There are no bonus marks for completing more than 8 labs (but note that the final exam question are based on *all* the labs).

Assignments

There will be 4 assignments, each with a maximum grade of 8%. All assignments will be submitted via Owl, with the following due dates:

Assignment #	Due Date
1	Sunday, January 26th at 11:55 PM
2	Thursday, February 13th at 11:55 PM
3	Sunday, March 15th at 11:55 PM
4	Wednesday, April 1st at 11:55 PM

Late assignment policy:

Assignment due dates are always via Owl. The Owl date of submission will be the “official” date of submission. Assignments emailed to the instructor or TA will **not** be accepted.

- Assignments passed in between up to 24 hours late will have 25% deducted
- Assignments passed in between 24 and 48 hours late will have 50% deducted.
- No assignments will be accepted after 48 hours.

If you have serious medical or compassionate grounds for an extension, you should take supporting documentation to the *Academic Counseling office* of your faculty, who will contact the instructor if an accommodation is recommended. Extensions can only be granted by the course instructor.

Appeal of Assignment Marks

- Appeals of assignment marks should be addressed to your T.A. first. If you and the T.A. cannot agree, then the T.A. and the student will discuss the situation with the instructor. That decision will be final.
- Appeals must occur within 1 week from the first day that the marked assignments or midterm exam were made available to students. After that 1 week period has gone by, no further appeals will be considered and the marks are considered final. Note that this rule applies even if assignments are not picked up when passed back. The week (8 day) count down starts from the date the assignment is passed back.

Mid-Term Exam

The midterm exam is Tuesday, **February 25th** in class. Its duration is 75 minutes and is worth 20% of the total mark for the course. A special ("make-up") midterm exam will be available for students who have received an academic accommodation.

Final Exam

The final exam is worth 40% of the total mark for the course and its duration is 3 hours. Its date is scheduled by the Registrar and will be communicated in due time. A special ("make-up") final exam will be available for students who have received an academic accommodation.

Neither Electronic Devices nor Book during Exams

Cellphones or laptop computers are **not** permitted during exams (Mid-term and Final). We cannot be responsible for the storage of these devices at the front of the class. Possession of either of these devices will be considered to constitute cheating!

Moreover, for both exams (Mid-term and Final) books will **not** be allowed.

Email Contact

The instructor and the teaching assistants occasionally need to send email messages to the class or to students individually. Email is sent to your Western University email address as assigned to you by ITS (Information Technology Services). It is your responsibility to read this email frequently (I recommend daily).

In accordance with [policy](#), 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.

Computing Facilities

The labs are in HSB14 or HSB16, general ITS university computing labs. The latest version of Matlab is available on the labs computers. You can have your own MatLab software on your laptops as long as Matlab version is 2009 or better. Students are entitled to the latest version of MatLab for their laptops or home computers (see the course webpage for details). There are many labs being held in HSB14 or HSB16, so these labs are not generally available at all times.

Other Computer Labs

- There are other labs available to you that are open on the weekend. The locations of all Western labs can be found [here](#)
- These include NCB105 and SS1032 as well as the [Genlab](#) located in Taylor Library. Hours for these labs can be found [here](#)
- All computers in the university computing labs will have MatLab available on them

Accommodation and Accessibility

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 see [Western's policies](#).

For further information, please consult the university's [policy on academic consideration for student absences](#) .

A student requiring academic accommodation due to illness should use the [Student Medical Certificate](#) when visiting an off-campus medical facility or an Accommodation Certificate from Student Health Services.

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](#)".

Academic Policies

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

Scholastic offenses are taken seriously and students are directed to read the appropriate policy, specifically, the [definition of what constitutes a Scholastic Offense](#).

Plagiarism

Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offense. All assignments are individual assignments. You may discuss approaches to problems among yourselves; however, the actual details of the work (assignment coding, answers to concept questions, etc.) must be an individual effort. Assignments that are judged to be the result of academic dishonesty will, for the student's first offense, be given a mark of zero with an additional penalty equal to the weight of the assignment also being applied. You are responsible for reading and respecting the Department of Computer Science policy on Scholastic Offenses and Rules of Ethical Conduct. The University of Western Ontario may use software for plagiarism checking. Students may be required to submit their written work and programs in electronic form for plagiarism checking. Statement on Academic Offenses Scholastic offenses are taken seriously and students are directed to read the appropriate policy, specifically, the [definition of what constitutes a Scholastic Offense](#).

Additionally,

1. 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>).
2. Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Tutoring

The role of tutoring is to help students understand course material. Tutors should not write part or all of an assignment. Having employed the same tutor as another student is not a legitimate defense against an accusation of collusion, should two or more students hand in assignments considered similar beyond the possibility of coincidence.

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.

Policy on Accommodation for

- Students with [Disabilities](#)
- [Religious Holidays](#)

Students who are in emotional/mental distress should refer to [Mental Health@Western](#) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the University Students Council [USC](#).