ADS2088F 572
Introduction to Programming and Basic Data Analysis
Fall 2025

Instructor: Dr. Lori Murray
Email: lsincla3@uwo.ca

Course Information

Mode of Instruction: In Person

Calendar Description:

Topics include computational linear algebra, numerical optimization, simulation, use of IDEs, and display of statistical data.

Pre-requisite(s): 0.5 course from Mathematics 1229A/B, Mathematics 1600A/B, Numerical and Mathematical Methods 1411A/B.

Anti-requisite(s): Statistics 2864A/B, Data Science 1200A/B.

Extra Information: 3 lecture hours, 2 lab hours.

Course Weight: 0.50
Breadth: CATEGORY A
Subject Code: ADS

Notice: Unless you have either the requisites for this course (fulfilment of pre-requisites, no anti-requisite conflicts), or special permission from your Dean to enrol 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.

KING'S UNIVERSITY COLLEGE
WESTERN UNIVERSITY
ADS 2288F (2025-26)
SECTIONS 570 & 572

Instructor & Course Information

Course Instructor: Dr. Lori Murray
Email: lori.murray@uwo.ca

Lab Instructor: Prof. Vince Glavine
Email: vglavine@uwo.ca

Course Description: Introductory topics include computational linear algebra, numerical optimization, simulation, use of IDEs, and display of statistical data. Currently using Python (Spyder) and R (RStudio) programming languages.

Antirequisite(s): Statistics 2864A/B, Data Science 1200A/B.

Prerequisite(s): 0.5 course from Mathematics 1229A/B, Mathematics 1600A/B, Numerical and Mathematical Methods 1411A/B.

Learning Outcomes:
The primary purpose of this course is to provide a foundation in both languages, enabling the students to understand core programming concepts and the basic syntax of Python and R. By the end of this course, you will be equipped with the essential skills to further your learning and tackle more advanced topics in either language. The specific learning outcomes for this course are as follows:

- Understand fundamental programming concepts such as variables, data types, operators, and control structures in both Python and R.
- Learn the basic syntax of Python and R.
- Explore fundamental data structures like lists, tuples, arrays, vectors, data frames and matrices in both languages.
- Learn how to read data from various sources such as CSV files and databases.
- Understand how to write (save) data to different formats.
- Explore data manipulation techniques including filtering, sorting, merging, and reshaping data.
- Learn how to perform basic statistical analysis and summary statistics on data sets.
- Understand how to handle missing data and outliers.
- Learn how to create visualizations such as scatter plots, bar plots, histograms, and line plots using both Python and R.
- Understand best practices for writing clean, efficient, and maintainable code in Python and R.

Course Website

All course materials, content, and schedule related to the course including this course outline can be found on the OWL course website powered by Brightspace. Students are expected to be aware of information and make use of materials posted on the course web site.

Course Textbooks

Murray, Lori, "An Introduction to Programming with Python and R", (2025). Quarto Publishing. This is an open access interactive course textbook freely accessible to students. URL will be provided on OWL Brightspace.

Technology Requirements:

- We will be using iClickers during lectures; students are required to bring their mobile device to class. **Mobile devices are to be used during lectures for the purpose of iClicker participation only.**

Students who use their mobile device during lecture other than for iClicker participation will automatically receive a grade of 0 for that lecture's participation/attendance.

- Students are required to bring a reliable fully smart-charged laptop (that meets the system requirements for both Python and R) to all lectures and labs. It is strongly recommended that you use a Windows pc.
- This course uses Spyder <https://www.spyder-ide.org/> for Python and uses R base <https://www.r-project.org/> and RStudio <https://posit.co/download/rstudio-desktop/> for R. Instructions for downloading and installing the software will be provided in OWL.

Student Expectations:

- Regular attendance at classes.
- Completion of all assigned work.
- Assumption of complete responsibility to follow-up regarding any assessments which are missed.
- Awareness of items and use of materials posted on the course OWL web site.
- It is up to the student to seek out help when needed.

Course Assessments

1. In-class Participation / Attendance

The lectures will be interactive, and students are expected to attend and participate regularly. This course grade component will be **calculated using iClickers participation and a set of short exercises randomly assigned during lectures to be submitted to OWL by the end of the lectures**. Instructions on where to submit your short exercises will be provided during the lecture.

Details about iClicker will be available on OWL Brightspace. Students can use iClicker software free of charge through Western's license agreement. Each lecture will comprise of 2 to 5 iClicker questions.

The participation grade component will be calculated as follows:

- If a student participates in 80% or more of the clicker questions, they will receive full marks.
- If a student answers less than 80% of all clicker questions, the clicker mark will decrease linearly using the formula:

$$\text{Clicker mark} = 6.25y$$

where y is the proportion of all iClicker questions the student answered.

For example, if you answer 70% of the clicker questions, you will have 6.25 x 0.70 = 4.375 out of 5 marks towards your participation / attendance iClicker grade component. Note, if a student answers 40% or less of the clicker questions, the above formula will not be used, and a grade of 0 will be applied. See attendance policy below for more details.

Students should use their mobile devices (instead of laptops, etc.) when participating as GPS settings will be used with the software. Students will be assigned a participation grade only and must attend class to receive the grade. Students who are participating with iClicker AND are not present in-class (i.e., falsifying attendance and participation) will automatically receive a grade of 0 for the in-class participation course grade component.

The grading formula above provides a "free" 20% marking in participation which covers unexpected life events such as illness, etc., including technical issues. Students are responsible for ensuring they have a reliable mobile device at each lecture.

There are no make-ups for missed participation / attendance for any reason. No clicker grade adjustments will be made as it is already taken into consideration within the marking scheme.

2. Lab Schedule

The weekly labs will be held on the following dates:

Lab 1: Week of Sept 8 Welcome and Getting started with Python lab
Lab 2: Week of Sept 15 Learning lab
Lab 3: Week of Sept 22 ***Graded Lab Assignment 1***
Lab 4: Week of Sept 29 ***Graded Lab Assignment 2***

Lab 5: Week of Oct 6 Learning lab
Lab 6: Week of Oct 14 **Midterm Test on Python**
Lab 7: Week of Oct 20 Getting started with R lab
Lab 8: Week of Oct 27 ***Graded Lab Assignment 3***

Lab 9: Week of Nov 10 ***Graded Lab Assignment 4***
Lab 10: Week of Nov 17 Learning lab
Lab 11: Week of Nov 24 ***Graded Lab Assignment 5***

Lab 12: Week of Dec 1 Learning lab

Important Notes for labs:

1) Students must attend the lab they are enrolled in. The two sections of this course are run completely separate, and requests for attending alternate weekly labs will be denied.
2) There will be 5 graded lab assignments to be submitted to OWL – 2 on Python and 3 on R—due at the end of the graded lab session. Lab assignments submitted after the end of the lab session will have a 10% per day penalty applied. If a student misses one graded lab assignment on Python, the weight of the lab will be automatically redistributed to the midterm test on Python. If a student misses both graded lab assignments on Python, a mark of 0 will be automatically applied to the second lab on Python. If a student misses one graded lab assignment on R, the weight of the lab will be automatically redistributed to the final exam on R. If a student misses more than one graded lab assignment on R, a mark of 0 will be automatically applied to the second and any subsequent missed lab(s) on R. **Note, there are no make-ups or special individual exceptions to the graded lab component.**
3) It is strongly recommended that you use a Windows PC as there are less issues with the installation of programs and packages. If you experience technical difficulties, please consult King's IT Service: https://www.kings.uwo.ca/its/services/help-desk/All lab assessments must be submitted to the Assignment tool in OWL. Assignments submitted via email will not be marked.
4) Students are expected to come to each graded lab prepared and work independently.
5) On weeks without a graded lab or midterm test, the designated laboratory time will be used as learning labs with problem sets to help students improve their programming skills.

3. Midterm Test on Python
The in-lab test will be a 60-minute closed-book assessment requiring written responses.

- Wednesday Oct 15 from 2:30-3:30 pm for students enrolled in 572 (Monday lectures)
- Friday Oct 17 from 8:30 to 9:30 am for students enrolled in 570 (Wednesday lectures)

More details about the test will be provided in OWL. Academic consideration for this midterm test requires submission of formal supporting documentation. If the reason is not deemed valid, a mark of 0 will be applied. If the reason is deemed valid, the make-up test will take place on Friday, Oct 24, 2025. **NOTE:** Students must write the midterm (covering Python) AND pass the final exam (which covers R) to pass this course. If you do not write the midterm test OR if you fail the final exam, your maximum grade in this course will be 47% and you will not receive course credit.

4. Project on R
Students have the option to choose one from the following three distinct project types for their project:

- Learn a new R package: Students can select a new R package to learn and explore its functionalities.
- Reflection of lectures in R: This option involves reflecting on the course lectures, synthesizing key concepts, and illustrating their understanding with relevant examples and discussions.

- Simple data analysis using a built-in dataset from R: Students may choose to perform a simple data analysis using a built-in dataset.

Each project is designed to allow students to demonstrate their understanding and application of R in different contexts. Three submissions to OWL are required for this assessment:

1) A brief proposal outlining the chosen project topic (due on Nov. 10th)
2) A comprehensive report, which can be created using R Markdown (due on Dec. 5th at 11:59 pm but will accept up until Dec 9th at 11:59 pm without penalty)
3) A 5–10-minute video presentation (due on Dec. 1, but will accept up until Dec 5th at 11:59 pm without penalty)

Detailed instructions, requirements, and the submission guide will be posted on OWL

5. Final Exam on R
The final exam on R will be scheduled by the Registrar's Office during the examination period (Dec 11-22, 2025).

Evaluation

Your course grade will be determined using the following marking scheme:

- Participation/Attendance (iClickers and in-class exercises) = 10%
- Lab Assignments (5 x 4% each) = 20%
- In-Lab Midterm Test on Python = 25%
- Project on R = 10%
- Final Exam on R = 35%

NOTE: Students must write the midterm (covering Python) AND pass the final exam (which covers R) to pass this course. If you do not write the midterm test OR if you fail the final exam, your maximum grade in this course will be 47% and you will not receive course credit. The final exam will be scheduled by the Registrar's Office during the examination period December 2025.

Academic Integrity:

- It is expected that all the work you submit will be your own.
- Academic integrity policies at Western require that instructors forward to their department chair or director any evidence of academic offenses.
- Cheating is taken seriously to protect the integrity of our measures of your learning.
- 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
- Graded lab assignments and the final project may be subject to similarity review (by hand or by software) to check for unusual coincidences in answer patterns that may indicate cheating.
- Instructors reserve the right to seek additional clarification about any submitted work (e.g. explain a solution) as part of any assessment.

King's is committed to fostering a culture of professionalism, honesty, and academic integrity, and all members of our community—faculty, staff, and students—have a role to play in promoting an ethical learning environment. Furthermore, through the work they submit for academic evaluation, students develop important habits of critical thinking, independent inquiry, and creativity. Thus, it is expected that students will submit work that is truly their own, completed without external assistance (human or artificial) except as explicitly permitted by the course instructor.

Within this course, use of artificial intelligence (AI) tools [such as Chat GPT] is prohibited in all assessments, including essays, tests, and examinations. Unauthorized use of AI will be subject to academic discipline.

Email Communication Policy

Students must use their uwo email address when emailing the instructor so it does not end up in spam and can be verified. Subject line must include ADS 2288F. MEM faculty will endeavor to respond to student emails within 2 business (working) days.

Email communication should be reserved only to provide information or ask a question that requires a very brief response; questions related to the course content (coding questions) should be communicated during regular office hours.

Attendance Policy

Attendance is required! Missing more than 25% of scheduled classes is considered to be too frequent. A warning email will be issued at the 25% point and if absences continue the instructor will implement the King's attendance policy below:

King's policy states that "A student may be debarred from writing the final exam for failure to maintain satisfactory academic standing throughout the year. 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."

* implies that faculty must be tracking and have communicated attendance concerns to student

Intellectual Property Statement

Course content created by a faculty member is considered the faculty member's intellectual property; it should not be distributed, shared in any public domain, or sold by a student or other third party without prior written consent of the faculty member. Sharing, posting, selling or using this material outside your personal use in this course is considered to be an infringement of intellectual property rights.

ADS 2288F (Approximate) Schedule of Topics – Fall 2025		
Week	**Topics**	**Weekly Labs**
1 *(Sept 8-12)*	Chapter 1: Introduction to Programming Chapter 2: Functions, IDE's Spyder, and Script Files	Getting started with Python: Learning lab
2 *(Sept 15-19)*	Chapter 3: Operators, Variables, Boolean Expressions, and Datatypes	Learning lab
3 *(Sept 22-26)*	Chapter 4: Lists, if Statements, Conditions, Loops and Functions	Graded Lab 1
4 *(Sept 29-Oct 3)*	Chapter 5: NumPy Chapter 6: Pandas	Graded Lab 2
5 *(Oct 6-10)*	Chapter 7 Matplotlib	Review Lab
6 (Oct 14-17)	**In-Lab Midterm Test on Python**	
7 *(Oct 20-24)*	Chapter 8: R Functions, RStudio, and Script Files Chapter 9: Syntax, Calculations, Common Commands, and Variables	Getting started with R: Learning lab
8 *(Oct 27-Oct 31)*	Chapter 10: Datatypes, Structures, and Base Functions	Graded Lab 3
(Nov 3-Nov 7)	**Fall reading week – no classes**	
9 *(Nov 10-14)*	Chapter 11: Random Numbers, if Statements, Loops, and Writing Custom Functions	Graded Lab 4
10 *(Nov 17-21)*	Chapter 12: Working with Dataframes	Learning lab
11 *(Nov 24-28)*	Chapter 13: Importing, Exploring, and Creating Data	Graded Lab 5
12 *(Dec 1-5)*	Chapter 14: Python vs R	Learning lab
Final Project is due Dec 1st. Final Exam to be scheduled by the Registrar's Office (Dec 11-22, 2025).		

KING'S UNIVERSITY COLLEGE

GENERAL COURSE POLICIES

2025-2026

1. Academic Accommodations, Consideration for Absences

Academic Accommodation (Accessibility)

Accessibility Services works to ensure that academic programs are accessible to all students, and supports students who may have a condition related to, but not limited to, vision, hearing, mobility, different ways of learning, mental health, chronic illnesses, chronic pain, autism spectrum disorder, ADD/ADHD, and temporary conditions (beyond short-term academic consideration). Accessibility Services provides recommendations for accommodation based on medical documentation or psychological and cognitive assessment. The accommodation policy can be found here Academic Accommodation for Students with Disabilities. Information on Accessibility Services at King's can be found here.

Academic Consideration for Student Absence

If a student is unable to meet a course requirement due to substantial but temporary extenuating circumstances (medical or compassionate), they should follow the procedures below.

In some cases, where instructors have built flexibility into their assessments, this flexibility will already address consideration needs.

Requests for academic consideration should be directed to the Academic Advising Office of your faculty/college of registration. Requests must be made as soon as possible and no later than 48 hours after the missed assessment.

As a rule, documentation is required for academic consideration. For academic consideration requests on medical grounds, the Student Medical Certificate is available at https://www.kings.uwo.ca/kings/assets/File/currentStudents/courses_enrollment/exams_and_tests/SMC-Feb-2025.pdf.

Students are permitted one academic consideration request without supporting documentation per term per course.

Instructors may designate one assessment per half-course weight as requiring formal supporting documentation. Please refer to the course outline for each course.

For further information, please see:
https://uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf

Absences from Final Examinations

If you miss the Final Exam, contact the Academic Advising Office of your faculty/college 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, or more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has

been deferred. See the Academic Calendar for details (under Special Examinations).

Religious Accommodation

Students should consult the University's list of recognized religious holidays, and should give notice in writing to the instructor and Academic Advising Office if a course requirement will be affected by a religious holiday/observance. Notice must be given as early as possible, and no later than two weeks prior to an examination, and one week prior to a midterm test date. It is the responsibility of such students to inform themselves concerning the work done in classes from which they are absent and to take appropriate action.

2. Support Services

Accessibility, Counselling and Student Development at King's University College:
https://www.kings.uwo.ca/current-students/student-services/

Students experiencing emotional or mental health distress can access services at King's University College:
http://www.kings.uwo.ca/current-students/campus-services/student-support-services/personal-counselling/

Good2talk is a good online and phone 24/7 resource for students and is available in English, Mandarin, and French: https://good2talk.ca, 1-866-925-5454

MentalHealth@Western provides a complete list of options about how to obtain help:
https://www.uwo.ca/health/mental_wellbeing/

Academic Support Services at King's University College:
https://www.kings.uwo.ca/current-students/academic-resources/

GBSV Support:

King's is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at: https://www.kings.uwo.ca/about-kings/safe-campus/gender-and-sexual-violence/

You can reach someone supports at Kings by emailing Care@kings.uwo.ca or calling 519-930-4640 to reach a social worker who can offer help.

You can also reach Western's Gender-Based Violence & Survivor Support Case Manager by email or by calling 519-661-3568.

Further supports can be found on this website: https://www.kings.uwo.ca/about-kings/safe-campus/gender-and-sexual-violence/

See also https://www.uwo.ca/health/student_support/survivor_support/get-help.html

University Students' Council offers many valuable support services for students, including the health insurance plan: http://westernusc.ca/services/

3. Statement on Use of Electronic Devices

Use of Electronic Devices: Unless explicitly stated otherwise, you are not allowed to have a cell phone, or any other electronic device, with you during tests or examinations. Unauthorized possession of such a device during a test or examination constitutes an academic offence.

Use of Laptops, Tablets, and Smartphones in the Classroom: King's University College at Western University acknowledges the integration of new technologies and learning methods into the curriculum. The use of electronic devices such as laptop computers, tablets, or smartphones can contribute to student engagement and effective learning. At the same time, King's recognizes that instructors and students share jointly the responsibility to establish and maintain a respectful classroom environment conducive to learning.

The use of electronic devices by students during lectures, seminars, labs, etc., shall be for matters related to the course at hand only. Students found to be using electronic devices for purposes not directly related to the class may be subject to sanctions under the Student Code of Conduct; see https://www.kings.uwo.ca/current-students/student-affairs/code-of-student-conduct1/

Inappropriate use of electronics (e.g., laptops, tablets, smartphones) during lectures, seminars, labs, etc., creates a significant disruption. As a consequence, instructors may choose to limit the use of electronic devices in these settings. In addition, in order to provide a safe classroom environment, students attending in-person class sessions are strongly advised to operate laptops with batteries rather than power cords.

4. Statement on Academic Offences

King's is committed to academic integrity. Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, is posted at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

It is expected that students will submit work that is truly their own, completed without external assistance (human or artificial) except as explicitly permitted by the course instructor. Check with you instructor on what tools, including generative AI (ChatGPT, translation tools, grammar-checking tools) are permitted in the course. Because a tool is permitted in one course, that does not mean it is permitted in other courses.

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; see https://elearningtoolkit.uwo.ca/tools/Originality Reports - TurnItIn.html.

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.

5. Copyright of Course Material

Lectures and course materials, including PowerPoint presentations, tests, outlines, and similar materials are protected by copyright. Faculty members are the exclusive owner of copyright in those materials they create. Students may take notes and make copies for their own use. Students may not allow others to reproduce or distribute lecture notes and course materials publicly (whether or not a fee is charged) without the express written consent of a faculty member. Unauthorized sharing of class content is subject to academic discipline.

Similarly, students own copyright in their own original papers and exam essays. If a faculty member wishes to post a student's answers or papers on the course website, they should ask for the student's written permission.

6. Use of Recordings

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation and/or the participant has the prior written permission of the instructor. Unauthorized recording and/or sharing of class content is subject to academic discipline.

7. Policy on Attendance

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.