



ADS2288F 572
Introduction to Programming and Basic Data Analysis
Fall 2026

Instructor: Tyler Pattenden, PhD
Email: tpattend@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
LONDON CANADA
SCHOOL OF MANAGEMENT, ECONOMICS, AND MATHEMATICS

ADS 2288F – Section 570 / 572
Introduction to Programming and Basic Data Analysis

Instructor: Dr. Tyler Pattenden (he/they)
Instructor Email: tpattend@uwo.ca
Student Hours: TBD (see note below)

Class Time:

Class Location:

Laboratory Time:

Laboratory Instructor: *See Brightspace*

Course Description:

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

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0.5 course from Mathematics 1229A/B, Mathematics 1600A/B, Numerical and Mathematical Methods 1411A/B.

Antirequisites:

Statistics 2864A/B, Data Science 1200A/B.

Course Overview:

Analytics and Decision Sciences 2288F is a course developed to give students an overview of programming skills in two languages: Python and R. In this course, we will spend approximately six weeks covering basic and intermediate skills in both languages. We will cover topics ranging from syntax to data structures and visualization in both languages. The focus will be teaching our students necessary skills to begin their programming journey. The instructor will assume that all students have little to no knowledge of either language; skills will be developed from the ground up.

Each week, students will participate in laboratory sessions in addition to their lecture sessions. In the laboratories, students will work alongside a lab instructor to practice and hone their programming skills. Students will be tasked with approximately bi-weekly laboratory assignments to test their knowledge and understanding and demonstrate their learning. These laboratories are set-up to be active learning activities and participation from students is expected.

The course has two main summative assessments – a Python test and an R project. Students will be asked to test their Python skills in-person in a test environment. Students will be asked to also develop a small R project on a chosen dataset from an instructor provided list to showcase their skills in R.

The essay word count requirement will be achieved through the development of code and the student's major project.

Course-Level Learning Outcomes:

By the end of the course, students will be able to:

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

Required: 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 Brightspace.

Additionally, students may choose to use the following resources as extra material (some examples or lab exercises maybe derived from these texts):

For Python: *Practical Programming (3ed)* by P. Gries, J. Campbell, and J. Montojo
ISBN: 978-1680502688

OR

Python Crash Course by E. Matthes
ISBN: 978-1593279288

For R: *A First Course in Statistical Programming with R* by J. Braun and D. Murdoch
ISBN: 978-1108995146

For Both: *Python and R for the Modern Data Scientist, The Best of Both Worlds* by R. Scavetta and B. Angelov
ISBN: 978-1492093404

Important websites and their utilization in this course:



Brightspace – This learning management system will be your hub to find all posted resources for this course. This will include lecture notes, assignment materials, laboratory instructions, data sets and any additional resources necessary for this course. It is your responsibility to check Brightspace each day, and to read all announcements posted on Brightspace. Please check OWL at least once every 48 hours.



Python – In the first half of the course, we will learn Python skills. Python is a wonderful computing language that is utilized by many companies outside of academia. No programming knowledge will be assumed.

Applications to Use Python – It is recommended that you download a Python interface on your personal computer, such as Anaconda. Anaconda houses a large number of programs that will be utilized throughout the course. We will almost exclusively use Spyder as our IDE for Python in this course. Students are welcome to use other IDE's such as Jupyter Notebooks, Google Colab or PyCharm.



R – In the second half of the course, we will learn R skills. R is another wonderful language used by many companies. R specializes in the development of statistical analysis and data visualizations.

Applications to Use R – We will mainly use two applications in the second half of the course – the software environment, R, with the base system and the contributed packages, as well as one of its most well-liked IDE, RStudio, which makes R easier to use.

Technology Requirements:

It is required that you have a personal computer (either desktop or laptop) that has the computing power to run Python and R. Before the first class, you **must** have Anaconda <[Anaconda Download Page](#)> downloaded and working on your personal computer. Before Week 7, you **must** have R <[The Comprehensive R Archive Network \(r-project.org\)](#)> and RStudio <[RStudio Desktop - Posit](#)> downloaded and working on your personal If you need any assistance with either program, please email the course instructor as soon as possible. We *recommend* in the ADS program to utilize a Windows based operating system (not iOS). Any technological issues with Apple products may not be solvable by the instructor, TA or ITS at King's.

Getting started instructions are available on Brightspace – detailed instructions on how to download both programming language IDE's is provided on Brightspace. Please review and download before the first class.

Evaluation:

Your final grade will be calculated through the following grading scheme:

Python Lab Assignments (lab assignments 1 and 2)	20%
R Lab Assignments (lab assignments 3, 4 and 5)	30%
Python Test (October 30 th from 6 – 8pm)	25%
R Project (see details below for deadlines)	15%
Attendance and Participation (throughout term)	10%

Details regarding each evaluation are given below.

Attendance and Participation:

To evaluate in class participation (attendance, understanding, etc.) we will be using iClicker (see Brightspace for details). During the first few lectures, we will have practice questions to assist all students in becoming familiar with the platform.

Your participation grade will be calculated as follows:

- If a student answers 80% to 100% of all clicker questions, they will receive the full 10%; and

- If a student answers less than 80% of all clicker questions, the clicker mark will be calculated using the formula

$$\text{mark} = 12.5(y)$$
where y is the proportion of all clicker questions answered.

Please note that students will receive a participation grade only if they attend class. The participation grade includes a "free" 20%, which accounts for unexpected life events such as illness and technical issues. It is the student's responsibility to ensure their device is working properly. *If you experience a technical issue during class, please send a written note to your instructor immediately afterward so that your record can be manually corrected.* However, if you are late for class, any iClicker questions you miss will not be added to your record.

Lab Assignments:

Throughout the course, students will have graded lab assignments in five of the eleven laboratory sessions (two based on Python programming, and three based on R programming). These are individual assignments to be completed during the laboratory time. Students are asked to complete the assignments without assistance from AI tools, but they may consult their class notes or previous learning lab materials. Lab assignments are built to test each student's programming ability, as well as their ability to synthesize their knowledge of programming with analytics – you may be asked to interpret results, create reports, or more. Students will have two hours to complete each lab assignment, and it must be handed in by the end of their designated lab sessions. Note that lab assignments are universally designed and can be completed much sooner than the two-hour mark. No extensions will be given. Each lab assignment is worth 10% of your final score. There are no make-ups for lab assignments. If student's miss a designated lab session with approved accommodation, the weight of the missed lab assignment will be equally distributed to all other lab assignments.

Python Test:

On October 30th, from 6:00PM to 8:00PM, students will take the Python test. This test is structured like a traditional midterm and may include multiple choice, short answer, debugging, or other types of questions. Full structure details for the Python test will be given at least two weeks prior to the test date. Students will not be allowed any aids – including a calculator, cheat sheet, or their computers – during the test. The test is to assess student understanding of Python syntax, code, and programming skills on an individual basis. There will be a make-up examination scheduled for one week after the originally scheduled test – details to be determined.

Students **must** pass the Python test to pass the course.

R Project:

Students will be tasked to complete a basic data analysis project in R. For this project, students will be asked to select a data set from a given list from the [TidyTuesday webpage](#) (the instructor will provide a list of a variety of datasets to try to hit your interest as best as possible). Students must complete the following tasks for this project:

1. Select a dataset and submit a 500-word (maximum) proposal for their project. Within the proposal, the student must include why they chose this dataset, what analysis they plan to do, and what they hope to find out – *due by November 13th at 11:59PM*

2. A comprehensive report created using R Markdown – *due by Dec 9th at 11:59PM*
3. A 3-Minute Thesis video presentation on your selected dataset and analysis – *due by Dec 9th at 11:59PM*
4. A two-question “test” of directed questions regarding your project scheduled during the exam period by the Registrar. Details to be posted.

Details regarding the report and video presentation will be provided on Brightspace. A rubric for both will also be provided. The goal of this project is for you to use your skills in R to develop a small project and analyse a real-world dataset. Submissions will be handled via Brightspace, and reports will be subject to Turnitin’s plagiarism and AI checking tools. The instructor reserves the right to discuss projects in more detail in an interview style setting that may affect the student’s overall score.

The first three tasks for the R project will include a window of an additional 48 hours for late submissions without penalty. No submissions after this window will be accepted, and students will receive a score of zero for the missed component. No additional extensions or make-ups will be granted.

Students **must** pass the R project to pass the course.

*Please note that students are required to pass both the Python test **AND** the R Project to pass ADS2288F. If a student fails the Python test or fails the R Project, the highest final grade they may attain is 47%, and they will not receive course credit.*

Instructor Contact Instructions:

The best method to contact your instructor for this course via email or through the Brightspace discussion forum. All emails **MUST** be sent through your official UWO email address (username@uwo.ca) so it does not end up in spam. The subject line of your email must include the course number (i.e., **ADS2288**). I will endeavour to respond to your emails within 2 business days.

Email communication should be reserved only to provide information or ask a question that requires a brief response. Any questions asked via email that have been answered in this outline or on the course website (Brightspace) will **not** be responded to. It is your responsibility to seek the information to the best of your ability before emailing your instructor.

Extra Notes Regarding Laboratories:

Please read the following notes regarding the laboratories for this course.

1. No unauthorized electronic devices or aids are allowed during the laboratory assignments – this includes any online AI tools (such as ChatGPT). Use of any communication devices during these assessments will result in an automatic grade of zero on that assessment, plus any additional penalties applied by the Dean’s Office.
2. AI tools, such as ChatGPT, are encouraged to be used during learning labs, however. In this new generation of postsecondary education, we encourage our students to utilize and critique what AI produces. It is beneficial to your learning to understand that AI is not perfect. It is also a useful skill to give a “pseudocode” to an AI tool and generate a program. We do expect that you, as a learner, do not rely solely on AI to produce code. Understanding the intricacies of Python and R is an important outcome of this course.

3. Instructions for learning labs will be distributed prior to the labs. Instructions for lab assignments will be available at the beginning of the lab assignment. Please note that a universal design is used for lab assignments.
 4. Each submitted lab assignment is typically 1 – 2 pages of typeset text (plus tables, charts and images as required), and part of the assessment is based on writing quality (including clarity). The file format expectations for lab report submissions will be clarified by the instructor prior to the first lab assignment.
 5. The instructor reserves the right to interview students about all submitted work, for any reason, including but not limited to seeking clarification and/or investigating suspected violations of academic integrity (cheating).
 6. Alternative assessments are not available for laboratory assignments. If you are unable to commit to attendance at lab sessions and completion of lab assignments, do not enroll in this course.
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Student Hours:

Some professors may call this time each week “office hours”, but I cannot stand that term as it makes it sound like I do not want you around. In fact, these hours are scheduled for you to come see me (we know a scary thought, right?). I will be sitting, more than likely alone, in my home awaiting you to grace me with your presence. This is your time to speak with me (your oh so scary professor) about course content, future directions, life, Netflix or whatever. Student hours will occur online via Zoom. Details about student hours will be given in the first lecture.

To give you a sense of how student hours work, watch this short video: <https://vimeo.com/270014784>¹

Equal Opportunity and Evaluation Policy:

The university is committed to academic integrity and has high ethical and moral standards. All students will be treated equally and evaluated using the criteria presented in this course outline and their respective weights. The evaluation criteria are based strictly on actual achievement, not on effort. Claims of an excellent academic history, of attendance in the course components, or of personal issues (family, relationship, financial, etc.) cannot be used to justify a higher grade in the course because they are not criteria for evaluation. The requirement for a higher grade to, for example, maintain a scholarship, enter a program, or obtain a higher GPA for various reasons, is not a justifiable reason for increasing your grade. If we increased or “bumped” your grade (i.e., gave you a grade that you did not legitimately earn), it would be unfair to the other students and a great disservice to the scholarships and programs who are evaluating all students on the basis of their grades. This means, for example, if you receive 58% in the course we will not “bump” your grade to a 60%; you will simply need to take the course again if you need 60%.

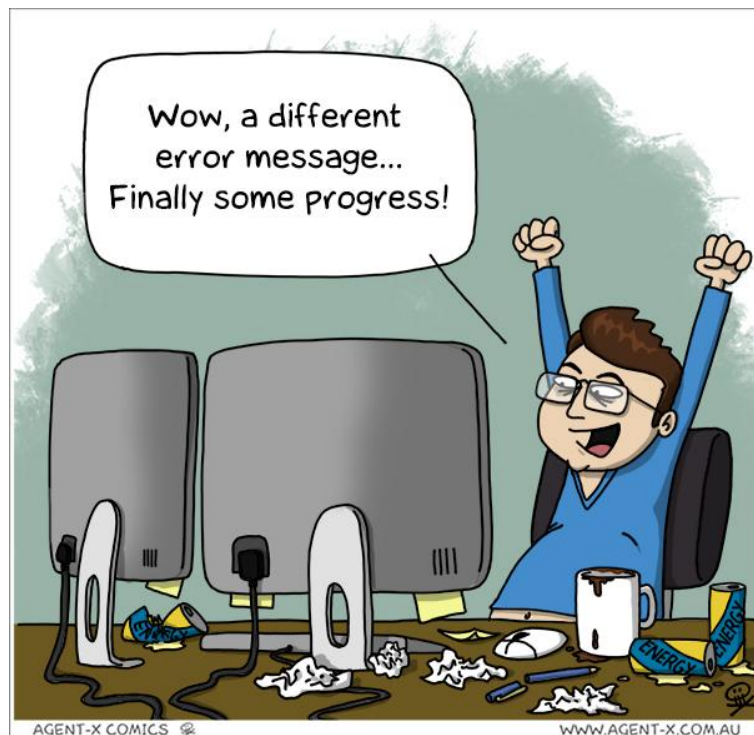
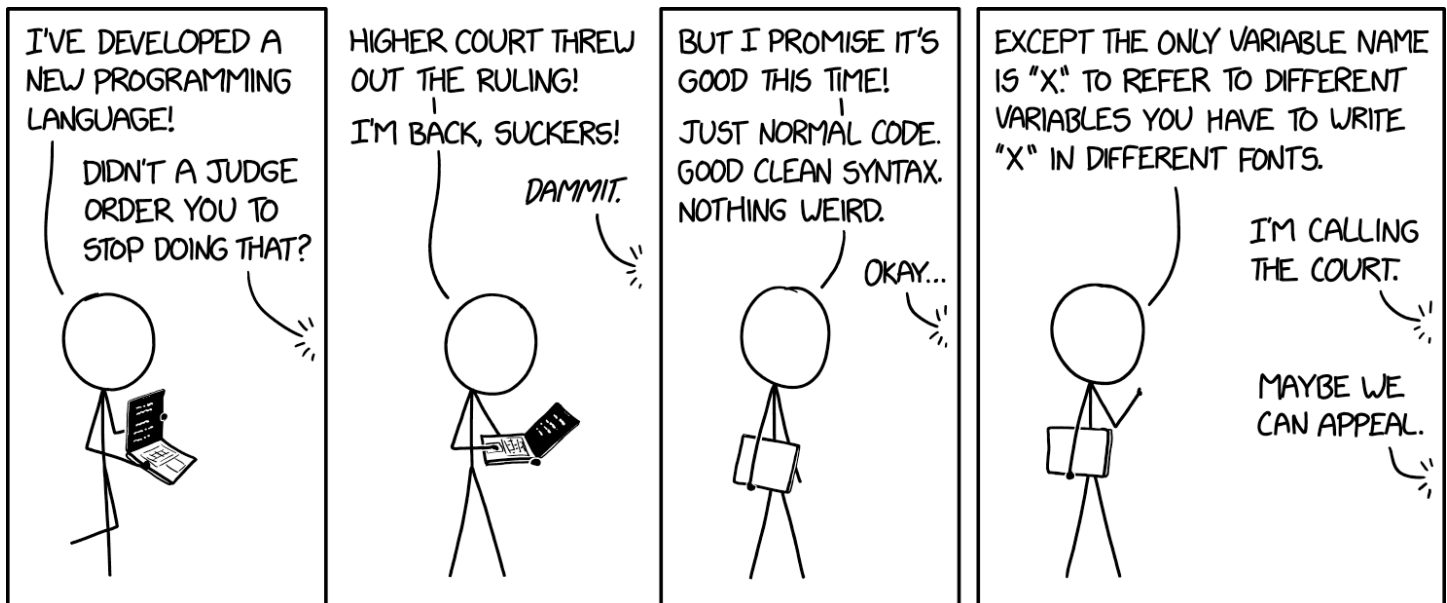
EDID Statement:

I am committed to having a respectful classroom where all feel welcomed. Our class time is a safe space to be yourself, and to question the course content. Discussion is always encouraged, and you should never feel silenced by me or a peer. We all come from different backgrounds, and that is what makes science (and the world!) an amazing place. If you ever feel disrespected, put down, or not included for whatever reason, please reach out to me. I will always be a safe person for you to talk to.

Decolonization Statement:

Western sits on the traditional territories of the Anishinaabek, Haudenosaunee, Lūnaapéewak and Chonnocton Peoples. The legacy of colonization and colonialism is felt globally and is imprinted in our educational system. Western is taking some initial steps toward recognizing it. Textbooks can be biased toward a particular cultural narrative. Science (especially Statistics and Mathematics) textbooks are no exception. I will strive to include unique content as much as I can, and I seek your feedback.

¹ It does bother me that Dr. Ishak calls them “office hours” ... but I digress ...



Tentative Schedule:

This is subject to change and should not be held as absolute. All due dates and deadlines will be posted on OWL for reference. This is a general guide to the course content.

Week #	Class Topics	Laboratory
1 (Sept 7 – 11)	-- no class --	-- no lab --
2 (Sept 14 - 18)	Chapters 1 and 2: Introduction to Programming and Python Fundamentals	Learning Lab: Getting Started with Python
3 (Sept 21 - 25)	Chapter 3: Operators, Variables, Boolean Expressions, and Datatypes	Learning Lab: Variables, Boolean Expressions and Datatypes
4 (Sept 28 – Oct 2)	Chapter 4: Lists, if Statements, Conditions, Loops and Functions	Lab Assignment #1
5 (Oct 5 - 9)	Chapters 5 and 6: numpy and pandas	Learning Lab: Loops and Libraries
6 (Oct 12 – 16)	-- Reading Week --	-- Reading Week --
7 (Oct 19 - 23)	Chapter 7: Matplotlib	Lab Assignment #2
8 (Oct 26 – 30)	Extra Topics: <i>To be determined</i>	Review for Python Test with Your TA
9 (Nov 2 - 6)	Chapters 8 and 9: R, RStudio, Script Files and Syntax	Learning Lab: R basics
10 (Nov 9 - 13)	Chapter 10: Datatypes, Structures, and Base Functions	Lab Assignment #3
11 (Nov 16 - 20)	Chapter 11 and ggplot2: Random Numbers, if Statements and plotting	Learning Lab: Plotting with ggplot2
12 (Nov 23 - 27)	Chapter 12/13 and dplyr: Working with Dataframes	Lab Assignment #4

13 (Nov 30 – Dec 4)	tidyverse Practice and Markdown Extras	Learning Lab: Working with the tidyverse
14 (Dec 7 – 11)	Chapter 14: Python vs R and Lab Assignment #5	-- no lab --

KING'S UNIVERSITY COLLEGE

GENERAL COURSE POLICIES

2026-2027

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://registrar.uwo.ca/academics/pdfs/student-medical-certificate.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://kings.uwo.ca/community/library/services/accessibility/>

Students experiencing emotional or mental health distress can access services at King's University College: <https://kings.uwo.ca/campus-life/student-supports/>

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-health/index.html>

Academic Support Services at King's University College:

<https://www.kings.uwo.ca/current-students/academic-resources/>

GBSV Support:

King's (Western) is committed to reducing incidents of gender-based sexual violence (GBSV) and providing compassionate support to anyone who is going through or has gone through these traumatic events. If you are experiencing or have experienced GBSV (either recently or in the past), you will find information about support services for survivors, including emergency contacts at the following website:

Mental Health and Wellness at King's - King's University College

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.

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.

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://kings.uwo.ca/sites/2025/assets/files/about/governance/policies/board/Board%20Policy%203_1%20Code%20of%20Student%20Responsibilities%20and%20Conduct.pdf

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 https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_offences.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 your 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.