

## DS 1000A Course Outline

### 1. Course Information

#### a. Course Information

Course Number: DS 1000A (all sections)

Course Name: Data Science Concepts

Course Description: Students will learn how to visualize and analyze continuous and categorical data from various domains, using modern data science tools. Concepts of distributions, sampling, estimation, confidence intervals, experimental design, inference, correlation will be introduced in a practical, data-driven way.

Class Times and Locations:

- 001 MWF 8:30 – 9:20 AM NSC1
- 002 MWF 3:30 – 4:20 PM SSC 2050
- 003 Tu 11:30 AM – 1:20 PM SSC 2050
- Th 11:30 AM – 12:20 PM MC 110

Lab Times and Locations:

- 004 M 4:30 – 5:20 PM BGSB-0153
- 005 M 5:30 – 6:20 PM BGSB-0153
- 006 W 4:30 – 5:20 PM BGSB-0153
- 007 F 4:30 – 5:20 PM BGSB-0153
- 008 Tu 3:30 – 4:20 PM BGSB-0153
- 009 Th 3:30 – 4:20 PM BGSB-0153

#### b. List of Prerequisites

One or more of Ontario Secondary School MCV4U, MHF4U, MDM4U, Mathematics 0109A/B, Mathematics 0110A/B, Mathematics 1229A/B, or equivalent.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) 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.

#### c. List of Antirequisites

Statistical Sciences 1023A/B, the former Statistical Sciences 1024A/B.

#### d. Personal Teaching Approach

I believe that students learn best in an inclusive, welcoming environment that sparks questions, discussions and respect from all sides. For this reason, a typical class will involve a lecture period discussing and explaining the material, broken up with non-graded check ins (through the use of Mentimeter or iClicker) to assess student understanding. Examples will be used both as part of the lectures, and part of active learning, where the students get time to practice the problems themselves. In cases where feedback from the assessment is immediate (such as with Mentimeter or iClicker), the lecture may be tailored to sections that were most misunderstood. I welcome relevant disruptions to this lecture period such as with questions or discussion topics. I encourage participation and discussions throughout the lectures, and the active learning components. Throughout all of these components, I strive to be respectful to all learners and their individual learning needs, and I expect you to do the same.

### **e. Instructor Policies**

As mentioned above, I expect respect and inclusivity in our classroom. To promote this, I have several policies that you should follow:

- Please do not be late. If you must be, please enter quietly and choose a seat closest to the door to limit the disruption
- Put your phones on silent and refrain from being on them. If you must answer your phone, immediately and quietly leave the room. I understand there are sometimes emergencies, but this should not disrupt other students.
- Please have Mentimeter/iClicker links open and ready to go.
- Treat others as you would like to be treated. When speaking for the first time in a new group, introduce yourself with your name, and pronouns if you feel comfortable. Do not judge others for their work in this class, their questions, or anything they choose to share.
- When others are speaking, whether it be instructor or student, listen and do not speak over them.
- Please allow 2 business day for a response via emails. I will not be answering emails in the evenings, weekends, or holidays, but I will get back to you as soon as possible. The same should be expected of your peers.

## **2. Instructor Information**

<b>Instructors</b>	<b>Email</b>	<b>Office</b>	<b>Office Hours</b>
Dr. Holly Steeves (She/her) (Course Coordinator, Sections 002 and 003)	<a href="mailto:Holly.steeves@uwo.ca">Holly.steeves@uwo.ca</a>	WSC 233	M 11:00-12:30 Th 1:00-2:30

Xiaotian (Joe) Zhu (Section 001)	<a href="mailto:xzhu444@uwo.ca">xzhu444@uwo.ca</a>	WSC 214A	MW 12:30-2:00
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Students must use their Western ([@uwo.ca](mailto:@uwo.ca)) email addresses when contacting their instructors and have “DS1000 A” in the subject line of their email, or their email may not be answered.

Only attend the office hours of your instructor. TA office hours (to be determined later) can be attended by anyone.

### 3. Course Syllabus, Schedule, Delivery Mode

#### a) Learning Outcomes

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

- Understand and correctly use foundational vocabulary associated with Statistics and Data Science.
- Interpret, create and critically evaluate graphical and numerical data summaries.
- Understand and appreciate probability, chance, randomness, and ‘average’.
- Understand, assess, and critique the conclusions of data analyses.
- Apply concepts learned in this course to future courses, careers, and everyday life.

#### b) Tentative Schedule

Week	Dates	Section	Lab
1	Sept 5-6	Syllabus/Outline	
2	Sept 9-13	1.1-1.6	<ul style="list-style-type: none"><li>• Introduction to Python and Google Colab</li><li>• Data frames, arrays, types of variables</li></ul>
3	Sept 16-20	2.1-2.8	<ul style="list-style-type: none"><li>• Basic python commands and functions</li></ul>
4	Sept 23-27	3.1-3.8	<ul style="list-style-type: none"><li>• Import data</li><li>• Histograms, pie charts, bar plots</li><li>• Five-number summary</li><li>• Boxplots</li><li>• Calculating standard deviations</li></ul>
5	Oct 1-4	4.1-4.6	<ul style="list-style-type: none"><li>• Generating normal data and plotting the corresponding histogram</li><li>• Calculating normal proportions</li></ul>
6	Oct 7-11	5.1-5.8 (skip 5.3)	<ul style="list-style-type: none"><li>• Scatterplots</li><li>• Linear correlation (Python function for Pearson's correlation)</li></ul>
	<b>Oct 14-18</b>	<b>READING</b>	<b>WEEK</b>
7	Oct 21-25	6.2-6.3	<ul style="list-style-type: none"><li>• Review for Midterm</li></ul>
8	Oct 28-Nov1	8.1-8.7	<ul style="list-style-type: none"><li>• Least-squares regression fit</li><li>• Interpretation of results table</li></ul>
9	Nov 4-8	9.1-9.7	<ul style="list-style-type: none"><li>• From raw data to two-way table</li><li>• Computing conditional and marginal proportions</li><li>• Relative risk, odds ratio</li><li>• Mosaic plots</li></ul>
10	Nov 11-15	12.1, 12.3-12.7	<ul style="list-style-type: none"><li>• Generating samples</li></ul>
11	Nov 18-22	13.1-13.6	<ul style="list-style-type: none"><li>• Venn diagrams</li></ul>

<b>12</b>	Nov 25-29	15.1-15.6	<ul style="list-style-type: none"> <li>• Mean sampling distribution</li> </ul>
<b>13</b>	Dec 2-6	16.1-16.4	<ul style="list-style-type: none"> <li>• Building normal based CIs</li> <li>• Bootstrap samples</li> <li>• Bootstrap CIs</li> </ul>

#### **Key Sessional Dates:**

Classes begin: September 5, 2024

Fall Reading Week: October 12 – 20

Classes end: December 6, 2024

Exam period: December 9 – 22, 2024

## **4. Course Materials**

### **a) Textbook**

The Basic Practice of Statistics, 9th Ed, 2021, by D. S. Moore; W. I. Notz; M. I. Fligner

Students can order a physical copy through the Book Store's website or purchase an e-book version through the following link:

[https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2024A&courses%5B0%5D=002\\_UW/DATASCI1000A](https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2024A&courses%5B0%5D=002_UW/DATASCI1000A)

### **b) Brightspace**

All course material will be posted to OWL: <https://westernu.brightspace.com/>

Students are responsible for checking the course OWL site (<https://westernu.brightspace.com/>) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the [OWL Brightspace Help](#) page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

### **c) Technical Requirements**

You will need some sort of device (laptop, phone, tablet) to be able to access course materials, submit assignments, and participate in clicker questions. Along with this, access to a stable internet connection may be required. Python and Google Colab will also be used so ensure you have the necessary requirements to use these two programs. If you need access to a computer for coursework, please contact the instructor as early as possible.

**d) iClicker**

iClicker will be used for attendance in the lab as well as for participation marks during class. Make sure you have created an account using the link from Brightspace using your name that is registered with Western, and your Western email account.

## 5. Methods of Evaluation

### a) Grading Scheme and Assessment Dates

The overall course grade will be calculated as listed below:

Assignments (4)	20%
Participation	5%
Lab Attendance	5%
Midterm Test (2 hr)	25%
Final Exam (3 hr)	45%

### b) Assessment Descriptions

- **Assignments will be available on the course Gradescope site. Assignments must be submitted through Gradescope** (<https://www.gradescope.ca/>) an online collaborative grading system. It is your responsibility to make sure that your assignment is successfully uploaded and legible. Submissions that cannot be read by the grader will receive a grade of zero. Assignment questions must be assigned properly to each page or the submission will not be graded.
- After receiving the grades from an assignment, **students will have seven days to submit any regrade requests on that assignment, with the exception of the final assignment which may have a shortened period.** After this seven-day period, regrade requests will NOT be accepted. Regrade requests must be made using the Gradescope tool “Regrade Request”.
- **Assignment submissions are due 11:55 pm (Eastern Time) on the due date.** Assignments that are up to 24 hours late will receive a deduction of 15% on their mark unless late coupons are used. Late assignments up to 48 hours will receive a deduction of 30% on their mark, unless late coupons are used. **No credit will be given for submissions beyond 48 hours of the deadline.**
- Each student will have **2 late coupons** worth 24 hours each that they can use at their own discretion for whatever reason (Note: I do not need to know the reason) towards their assignments. You can use them together on one assignment for a 48 hour extension, or on separate assignments for 24 hour extension. **No extensions will be given for any reason beyond the use of the late coupons, therefore I suggest saving them until you absolutely need them.** You do not need to tell me when you will use the coupons, they will automatically come off the first two late days.
- Solutions to assignments **will not** be posted; however, TAs will provide comments on incorrect answers using Gradescope, which will allow students to find out the correct solutions. In addition, students can ask the instructor and TAs for more details on solutions via the Regrade Request tool on Gradescope and during office hours.
- There are 12 **labs**, however you only need to attend 10 to earn 5% of your grade ( $10 \times 0.5\%$ ). We will use iClicker to track who is in attendance.
- Participation grades will be based on responses to the “check in” questions in class, and assessed using iClicker. While you do not need to answer the question correctly for the points,

nonsense answers may be disregarded at the instructors discretion (for example, answering e for a multiple choice question with no e answer). If you answer 90% of the iClicker questions, you will get the full 5 percent. Otherwise, it will be scaled down linearly.

- **Midterm** is tentatively scheduled for Oct 29, 7-9, to be confirmed by the Registrar. This will be closed book. You will be allowed **one single sided, letter sized, handwritten cheat sheet (handwritten means pen to paper, no printing from a computer or any kind)** and a **non-programmable calculator**. Students must bring their student ID with them to write the exam. Note: This is your one assessment that you cannot use a SRA on!
- **Final Exam** will be booked by the registrar's office, so date and time is to be determined. This will be closed book. You will be allowed **one double sided, handwritten, letter sized cheat sheet. Handwritten means pen to paper, no printing from a computer or any kind.**

### c) General information about missed coursework

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/academic\\_consideration\\_Sep24.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf),

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult [Accessible Education](#).

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:

[https://registrar.uwo.ca/academics/academic\\_considerations/](https://registrar.uwo.ca/academics/academic_considerations/)

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Examinations scheduled during official examination periods (Defined by policy)
- Midterm - Designated by the instructor as the one assessment that always requires documentation when requesting Academic Consideration)

When a student mistakenly submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.



#### **d) Evaluation Scheme for Missed Assessments**

Note: there is flexibility built into the assignments (late coupons), participation (only 90% required), and attendance (only 10/12 required), therefore, according to the current Academic Policy, instructors have the right to reject any approved absences, documented or undocumented (SRAs).

For the midterm exam, SRAs are not allowed. However, if you miss with an approved documented absence (approved by your faculty), the weight will be shifted onto the final exam.

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under [Special Examinations](#)), especially for those who miss multiple final exams within one examination period.

#### **e) Coursework with Assessment Flexibility**

By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

##### **Flexible Attendance**

**Labs.** This course has 12 labs, and only 10 are required to be attended to receive full attendance marks. Should extenuating circumstances arise, students do not need to request Academic Consideration for the first 2 missed labs. Academic consideration requests will be denied for the first 2 missed labs. The instructor has the right to deny any and all Academic Consideration requests beyond the 2 missed labs built in.

##### **Deadline with a No-Late-Penalty Period**

**Assignments.** Students are expected to submit each of the 4 assignments by the deadline listed. Should extenuating circumstances arise, students do not need to request Academic Consideration and they are permitted to submit their assignment up to 48 hours past the deadline without a late penalty with the use of a late coupon. They have two late coupons worth 24 hours each to use throughout the entire term, so use them wisely. Should students have run out of late coupons, if their assignment is submitted past the deadline, a late penalty of 15% per day will be applied. Assignments will not be accepted 48 hours after the assignment deadline. The instructor may deny all requests for Academic Consideration, give them a zero mark, and let students follow the appeal pathway to ask for an exception.

## **6. Additional Statements**

### **Religious Accommodation**

When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

<https://www.edi.uwo.ca>.

### **Accommodation Policies**

Students with disabilities are encouraged to contact Accessible Education, 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](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

### **Academic Policies**

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

In accordance with policy,

[https://www.uwo.ca/univsec/pdf/policies\\_procedures/section1/mapp113.pdf](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 their official university address is attended to in a timely manner.

All electronic devices (including but not limited to, tablets, laptops, programmable calculators, cell phones, smart watches, smart glasses, etc) are not permitted during tests and exams, with the exception of a non-programmable calculator.

**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:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

Note: Using AI to generate code for assignments is strictly prohibited. This will be considered an academic offense.

Clickers, namely iClicker, will be used for attendance in the labs, as well as participation grades in class. See section 5b for details. Student information and privacy will be adhered to on iClicker questions just as it would for tests and other assessments. The gathered data will be used in class to assess how students are understanding the content, but will not be used in any other research or analysis. Because this is participation grades, you must use your own clicker logged into your own account in order to receive the grades.

### **Support Services**

Please visit the Science & Basic Medical Sciences Academic Advising 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/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western 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.uwo.ca/health/student\\_support/survivor\\_support/get-help.html](https://www.uwo.ca/health/student_support/survivor_support/get-help.html).

To connect with a case manager or set up an appointment, please contact [support@uwo.ca](mailto:support@uwo.ca).

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

[http://academicsupport.uwo.ca/accessible\\_education/index.html](http://academicsupport.uwo.ca/accessible_education/index.html)

if you have any questions regarding accommodations.

Learning-skills counsellors at Learning Development and Success (<https://learning.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.

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/>.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.