

Medical Sciences
MedSci 3391A: Truth and Lies in biomedical Big Data

Course Outline for Fall 2026

This course takes place at Western University, which is located on the traditional territories of the Anishinaabek, Haudenosaunee, Lūnaapéewak, and Chonnonton Nations, on lands connected with the London Township and Sombra Treaties of 1796 and the Dish with One Spoon Covenant Wampum. We encourage all students and faculty to consider historical and ongoing decisions that enable them to have the privilege of attending / teaching this course while others do not enjoy that opportunity.

Students who are in emotional and/or mental distress should refer to <https://www.uwo.ca/health/> for a complete list of options about how to obtain help.

1. Technical Requirements:



Stable internet connection



Laptop/tablet or other portable computing device

2. Important Dates:

Classes Begin	Reading Week	Classes End	Study day(s)	Exam Period
September 9	October 10-18	December 9	December 10	December 11–22

September 30, 2026: National Day for Truth and Reconciliation; non-instructional day

September 17, 2026: Last day to add or drop a Fall 12-week course

November 30, 2026: Last day to withdraw from a Fall 12-week course without academic penalty

3. Contact Information

Course Coordinator	Contact Information
Dr. Tallulah Andrews	tandrew6@uwo.ca

Instructor(s) and Teaching Assistant(s)	Contact Information
Dr. Greg Gloor	ggloor@uwo.ca
Dr. Mike Hallett	michael.hallett@uwo.ca
Dr. Vanessa Dumeaux	vdumeaux@uwo.ca
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Wenqi "Mavis" Yang	wyang335@uwo.ca
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4. Course Description and Design

Delivery Mode: blended

Course Description: Design of high throughput experiments, analysis of the resulting large datasets, installation and use of standard bioinformatic programs, collection of clean datasets from private and public sources, execution of exploratory and analytical analyses. Critical thinking, open science, data-sharing and reproducible analysis, and acquisition of practical skills will be common themes.

Antirequisite(s): Medical Bioinformatics 3100A/B, Computer Science 4461A/B. Extra Information: Blended course, 2 lecture hour, 1 lab/tutorial hour, 1 hour online instruction.

Prerequisite(s): Biochemistry 2280A; Biology 2581A/B; either Biology 2244A/B or Statistical Sciences 2244A/B.

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.

Timetabled Sessions

Component	Date(s)	Time
Lecture 1	W	11:30-12:30
Lecture 2	Th	16:30-17:30
Self-Study	Mon-Fri	Self-Directed
Lab 002	Fri	10:30-11:30
Lab 003	Fri	11:30-12:30
Lab 004	Fri	13:30-14:30
Lab 005	Fri	14:30-15:30

- ☒ Asynchronous pre-work (Self-Study) must be completed 1 day prior to Lab
- ☒ Attendance at sessions is required
- ☒ Missed work should be completed within 24 hours
- ☒ A recording **may** be provided of the Lectures

All course material will be posted to OWL Brightspace: <https://westernu.brightspace.com/d2l/login>. Any changes will be indicated on the OWL Brightspace site and discussed with the class.

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

Current versions of all popular browsers (e.g., Safari, Chrome, Edge, Firefox) are supported with OWL Brightspace; what is most important is that you update your browser frequently to ensure it is current. All JavaScript and cookies should be enabled.

5. Learning Outcomes

Upon successful completion of this course, students will be able to:

- use the R programming language for data exploration
- construct and troubleshoot simple command-line scripts
- combine commands together to complete common tasks
- formulate reproducible notes in an Rmarkdown document for data/code sharing
- contrast different experimental designs and data collection approaches
- explain and justify the open science approach
- design and run statistical analyses to answer biomedical questions
- organize and use metadata appropriately
- distinguish statistical dependence vs causal relationships
- explain how to appropriately scale statistical testing to high throughput datasets
- use common machine learning approaches for analyses

6. Course Content and Schedule

Lec/Tut	Dates	Topic	Instructor
Lecture 1	Sept 9 (Wed)	Introduction to R	Dr. Gloor
Lecture 2	Sept 10 (Thu)	Introduction to R	Dr. Gloor
Tutorial 1	Sept 11 (Fri)	Intro to R & Posit Cloud	TA
Lecture 3	Sept 16 (Wed)	Graphing data for interpretability	Dr. Gloor
Lecture 4	Sept 17 (Thu)	Graphing data for interpretability	Dr. Gloor
Tutorial 2	Sept 19 (Fri)	Graphing data for interpretability	TA
Lecture 5	Sept 23 (Wed)	Introduction to 'omics data	Dr. Gloor
Lecture 6	Sept 24 (Thu)	Accessing & managing biomedical data	Dr. Dumeaux
Tutorial 3	Sept 25 (Fri)	Accessing & managing biomedical data	TA
Sept 30 (Wed)		No class (Truth & Reconciliation day)	
Lecture 7	Oct 1 (Thu)	Experimental Designs	Dr. Dumeaux
Tutorial 4	Oct 2 (Fri)	Experimental Designs	TA
Review	Oct 7 (Wed)	Review	Dr. Dumeaux
Quiz1	Oct 8 (Thu)	Quiz 1 (10%)	Proctor
Oral	Oct 9 (Fri)	Oral Participation Grade (10%)	All instructors
Oct 12–Oct16		Reading week	
Lecture 8	Oct 21 (Wed)	Biases & Errors	Dr. Dumeaux
Review	Oct 22 (Thu)	Review	Dr. Dumeaux
Tutorial 5	Oct 23 (Fri)	Biases & Errors	TA
Lecture 9	Oct 28 (Wed)	Big Data & Multiple Testing (Not on Mid Term)	Dr. Andrews
Mid-Term	Oct 29 (Thu)	Mid Term (30%)	Proctor
Tutorial 6	Oct 30 (Fri)	Multiple Testing	TA
Lecture 10	Nov 4 (Wed)	Basic Regression	Dr. Andrews
Lecture 11	Nov 5 (Thu)	Basic Regression	Dr. Andrews
Tutorial 6	Nov 6 (Fri)	Basic Regression	TA
Lecture 12	Nov 11 (Wed)	Multivariate Regression	Dr. Andrews
Lecture 13	Nov 12 (Thu)	Multivariate Regression	Dr. Andrews
Tutorial 7	Nov 13 (Fri)	Multivariate Regression	TA
Lecture 14	Nov 18 (Wed)	Intro to Machine Learning (Not on Quiz 2)	Dr. Hallett
Quiz 2	Nov 19 (Thu)	Quiz 2 (10%)	Proctor
Tutorial 8	Nov 20 (Fri)	Introduction to Machine Learning	Dr. Hallett
Lecture 15	Nov 25 (Wed)	Life in not Linear	Dr. Hallett
Lecture 16	Nov 26 (Thu)	Life in not Linear	Dr. Hallett
Tutorial 9	Nov 27 (Fri)	Life in not Linear	TA
Lecture 17	Dec 2 (Wed)	Deep Learning	Dr. Hallett
Lecture 18	Dec 3 (Thu)	Deep Learning	Dr. Hallett
Tutorial 10	Dec 4 (Fri)	Deep Learning	TA
Lecture 19	Dec 9 (Wed)	Ethics in AI	Dr. Hallett

7. Participation and Engagement

- ☒ Students are expected to participate and engage with content as much as possible
- ☒ Students are expected to participate by interacting in the forums with their peers and instructors

8. Assessment and Evaluation

Below is the evaluation breakdown for the course. Any deviations will be communicated.

Assessment	Format	Weighting	Due Date	Flexibility
Quizzes (Thurs)	Short Answer	10% each	Oct 8 th (in class) Nov 19 th (in class)	Not applicable
Midterm Test*	Mixed format	30%	Oct 29 th (in class)	Not applicable
Participation Grade	Oral (15 minutes, small group)	10%	Oct 9 th (in class)	Not applicable
Final Exam	Mixed format (3h, Cumulative)	40%	During Exam Period	Not applicable

Designated Assessment: Instructors are permitted to designate one assessment per course per term as requiring supporting documentation to receive academic consideration. See below for information on academic consideration policy and missed course work. For this course the following assessment has been designated as requiring supporting documentation:

- MIDTERM TEST (Oct 22nd in Class)

Information about flexibility in assessment

- ☒ Flexibility in assessment has been applied to this course; therefore, academic consideration requests may be denied on the assessments where flexibility is included

General information about assessments

- ☒ All assignments are due at 23:59 EST unless otherwise specified
- ☒ Assessments should be considered cumulative unless otherwise stated.
- ☒ Students are responsible for ensuring that the correct file version is uploaded; incorrect submissions including corrupt files will receive a 0
- ☒ Written assignments will be submitted to Turnitin (statement in policies below)
- ☒ Students will have unlimited submissions to Turnitin
- ☒ Rubrics will be used to evaluate assessments and will be posted with the instructions. For the Quizzes, Midterm and Final Exam the number of marks per question will be provided at time of assessment. Grading rubrics will be provided when the assessment is returned to students.
- ☒ A student might not receive the same grade as their group members if it is determined that the distribution of work was not equal
- ☒ After an assessment is returned, students should wait 24 hours to digest feedback before contacting their evaluator; to ensure a timely response, reach out within 7 days
- ☒ Assessment re-grading could result in the mark, increasing, decreasing, or remaining the same. Regrading requests should be submitted via Gradescope, or sent to the appropriate instructor if Gradescope regrading is not available.
- ☒ Prior to the filing of a written request for relief, students must attempt to resolve the concern regarding a mark or grade through informal consultation with the instructor. If the student is dissatisfied with the decision of the instructor or does not receive a decision from the instructor, a written request for relief must be submitted to the Department Chair within three (3) weeks from the date that the mark was issued.

The table below outlines the University-wide grade descriptors.

A+	90-100	One could scarcely expect better from a student at this level
A	80-89	Superior work which is clearly above average
B	70-79	Good work, meeting all requirements, and eminently satisfactory
C	60-69	Competent work, meeting requirements
D	50-59	Fair work, minimally acceptable
F	below 50	Fail

Information about late or missed assessments:

- ☒ Late assessments without academic consideration will receive a 0.
- ☒ An assessment cannot be submitted after it has been returned to the class; the weight will be transferred to the final exam.
- ☒ A make-up quizzes and midterm will not be offered, and the weight of any missed test will be transferred to the final examination
- ☒ The final exam must be completed with a grade of at least 50% to pass the course. If these elements are missed the student will receive an INC and student completes it the next time the course is offered.
- ☒ Only one special examination (see below) will be offered in January.

INC (Incomplete Standing): If a student has been approved by the Academic Advising Office (in consultation with the instructor/department) to complete term work at a later date, an INC will be assigned, which could impact program progression. Students with INC will have their course load in subsequent terms reduced to allow them to complete outstanding course work. Students may request permission from Academic Advising to carry a full course load for the term the incomplete course work is scheduled.

SPC (Special examination): If a student has been approved by the Academic Advising Office to write a Special Examination and the final exam is the only outstanding course component, an SPC will be assigned. If the class has a makeup exam, the student is expected to write the makeup exam. If the class doesn't have a makeup for the final exam or the student misses the makeup for the final exam for reasons approved by the Academic Advising Office, the student will write the exam the next time the course is offered, which could impact program progression. Outstanding SPCs will reduce the course load for the term the exam is deferred as outlined in [Definitions of Types of Examinations](#) policy.

9. Communication

- ☒ Students should check the OWL Brightspace site every 24–48 hours
- ☒ Students should email their instructor(s) and teaching assistant(s) using email.
- ☒ Emails will be monitored daily; students will receive a response in 24–48 hours
- ☒ This course will use discussions on Brightspace.
- ☒ Students should post all course-related queries on the discussion forum so that everyone can access the questions and responses

10. Office Hours

- ☒ Office hours will be held in-person
- ☒ Office hours will be held Tuesday PM [location and time will be announced on Brightspace]
- ☒ Office hours will be drop in
- ☒ Office hours will be group

11. Course Materials

- ☒ All resources will be posted on OWL Brightspace
- ☒ Additional resources: Posit Cloud student account (\$5/month)

12. Professionalism & Privacy

Western students are expected to follow the [Student Code of Conduct](#). Additionally, the following expectations and professional conduct apply to this course:

- ☒ All course materials created by the instructor(s) are copyrighted and cannot be sold/shared/upload (e.g., Must Knows Facebook group, Course Hero, Chegg, ChatGPT, etc.)
- ☒ Recordings are not permitted (audio or video) without explicit permission
- ☒ Permitted recordings are not to be distributed
- ☒ Students will be expected to take an academic integrity pledge before some assessments

Western is committed to providing a learning and working environment that is free of harassment and discrimination. All **students**, staff, and faculty have a role in this commitment and have a responsibility to ensure and promote a safe and respectful learning and working environment. Relevant policies include Western's [Non-Discrimination/Harassment Policy \(M.A.P.P. 1.35\)](#) and [Non-Discrimination/Harassment Policy – Administrative Procedures \(M.A.P.P. 1.35\)](#). Any **student**, staff, or faculty member who experiences or witnesses' behaviour that may be harassment or discrimination **must report the behaviour** to the Western's [Human Rights Office](#). Harassment and discrimination can be human rights-based, which is also known as EDI-based, (sexism, racism, transphobia, homophobia, islamophobia, xenophobia, antisemitism, and ableism) or non-human rights-based (personal harassment or workplace harassment).

13. How to Be Successful in this Class

Students enrolled in this class should understand the level of autonomy and self-discipline required to be successful.

1. Invest in a planner or application to keep track of your courses. Populate all your deadlines at the start of the term and schedule your time throughout the course.
2. Start working on asynchronous components at the start of the week.
3. Read instructions carefully and well before assignment deadlines, as questions when necessary for clarification.
4. Make it a daily habit to log onto OWL Brightspace to ensure you have seen everything posted to help you succeed in this class.
5. Take notes as you go through the lesson material. Work through code examples by hand to understand how it works.
6. Generate and work through practice questions with AI or with fellow students.
7. DO NOT memorize function names or pieces of code, focus on the logic and understanding the steps rather than specific syntax.
8. Ask questions! This topic is new to everyone in the class. If you are struggling with a topic, check the online discussion boards or contact your instructor(s) and or teaching assistant(s).
9. Reward yourself for successes. It seems easier to motivate ourselves knowing that there is something waiting for us at the end of the task. Focus on what you have achieved, not on where you 'lost' marks.

14. Western Academic Policies/Procedures and Statements

A. Absence from Course Commitments

Medical, Compassionate, or Extenuating Circumstances

Students missing course work for medical, compassionate, or extenuating circumstances can request academic consideration by completing a request at the [Student Absence Portal](#). Students are permitted one academic consideration request per course per term **without** supporting documentation. Note that supporting documentation is **always** required for academic consideration requests for examinations scheduled by the office of the registrar (e.g., December and April exams) and for practical laboratory and performance tests (typically scheduled during the last week of the term).

Students should also note that the instructor may **designate** one assessment per course per term that requires supporting documentation. This designated assessment is described elsewhere in this document. Academic consideration requests may be denied when flexibility in assessment has already been included. Examples of flexibility in assessment include when there are assessments not required for calculation of the final grade (e.g. 8 out of 10 quizzes) or there is flexibility in the submission timeframe (e.g. 72 hour no late penalty period).

Please note that any academic considerations granted in this course will be determined by the instructor of this course, in consultation with the academic advisors in your Faculty of Registration, in accordance with information presented in this course syllabus. Supporting documentation for academic considerations for absences due to illness should use the Student Medical Certificate or, where that is not possible, equivalent documentation by a health care practitioner.

Policy: [Academic Consideration – Undergraduate Students in First Entry Programs](#)

Procedures: [Student Medical Certificate](#)

Religious Holidays

Students should review the policy for Accommodation for Religious Holidays (Appendix 1). Where a student will be unable to write examinations and term tests due to a conflicting religious holiday, they should inform their instructors as soon as possible but not later than two weeks prior to writing the examination/term test. In the case of conflict with a midterm test, students should inform their instructor as soon as possible but not later than one week prior to the midterm.

Policy: [Accommodation for Religious Holidays](#)

Special Examinations

A Special Examination is any examination other than the regular examination, and it may be offered only with the permission of the Dean of the Faculty in which the student is registered, in consultation with the instructor and Department Chair. Permission to write a Special Examination may be given on the basis of compassionate or medical grounds with appropriate supporting documents. To provide an opportunity for students to recover from the circumstances resulting in a Special Examination, the University has implemented Special Examinations dates.

Policy: [Definitions of Types of Examinations](#)

B. Academic Appeals and Scholastic Offenses

Students can file a **request for relief from academic decisions** if the request is based on one or more grounds listed in the policy. Requests for relief generally fall into three categories, which are also listed in the policy. All requests for relief must be supported by evidence. A request for relief from academic decisions process was formally referred to as an appeal. Refer to the policy and procedures about further details and timelines.

Policy: [Requests for Relief from Academic Decisions](#)

Procedures: [Undergraduate Student Academic Requests for Relief](#)

Scholastic offences are taken seriously, and students are directed to read the appropriate policy, specifically, the definition of what constitutes a scholastic offence.

Policy: [Scholastic Offences](#)

Procedures: [Undergraduate Scholastic Offences](#)

Students may **appeal** some academic and scholastic disciplinary decisions by a Dean or their designate, to the Senate Review Board Academic (SRBA).

Policy: [Senate Review Board Academic Appeals](#)

Procedures: [Senate Review Board Academic Appeals](#)

C. Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Accessible Education (AE) at 661-2111 x 82147 for any specific question regarding an accommodation.

Policy: [Academic Accommodation for Students with Disabilities](#)

D. Correspondence Statement

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.

E. Discovery Credit Statement

Students are permitted to designate up to 1.0 Discovery Credit course (or equivalent) for pass/fail grading that can be counted toward the overall course credits required for their degree program.

Policy: [Undergraduate Course Credit](#)

Procedures: [Discovery Credits](#)

F. Statement on the Use of Electronic Devices

Use of any electronic device is strictly prohibited during Quizzes, the Midterm Test, and the Final Exam.

Use of electronic devices is mandatory during lab sessions; students are required to bring a portable computing device to all lab sessions.

G. Statement on the Use of Generative Artificial Intelligence (AI)

Generative AI is prohibited during Quizzes, the Midterm Test, and the Final Exam. Students are permitted to use AI in any way they wish for take-home assignments, however it is essential that students critically evaluate the obtained code / information and exercise independent thinking. Students should include comments specifying the source of any code or text that they obtained from generative AI, failure to do so will be considered an Academic Offence.

H. Turnitin and other similarity review software

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 Western University and [Turnitin.com](https://www.turnitin.com).

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

15. BMSUE Academic Policies and Statements

A. Cell Phone and Electronic Device Policy (for in-person tests and exams)

The Schulich School of Medicine & Dentistry is committed to ensuring that testing and evaluation are undertaken fairly across all our departments and programs. For all tests and exams, it is the policy of the School that any electronic devices, e.g., cell phones, tablets, cameras, smart glasses, smart watch or iPod are strictly prohibited. These devices **MUST** be left either at home or with the student's bag/jacket at the front of the room and **MUST NOT** be at the test/exam desk or in the individual's pocket. Any student found with one of these prohibited devices will receive a grade of zero on the test or exam and this will be documented as a Scholastic Offence. Non-programmable calculators are only allowed when indicated by the instructor. The program is not responsible for stolen/lost or broken devices.

B. Copyright and Audio/Video Recording Statement

Course materials produced by faculty are copyrighted and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws. You must always ask permission to record another individual and you should never share or distribute recordings.

C. Rounding of Marks Statement

Across the Basic Medical Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. **Final grades** in this course are rounded to the nearest whole number based on the first decimal place. For example, a grade of 74.49 or lower will be rounded to 74, whereas 74.50 or higher will be rounded to 75.

Marks WILL NOT be arbitrarily increased to the next grade or GPA, e.g., a 79 will NOT be increased to an 80, and 84 WILL NOT be increased to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for arbitrary mark increasing will be denied. Marks will be assigned based on assessments in the syllabus and no extra work or tasks will be assigned to increase a mark.

Course grade rounding provisions, as described above, differ from cumulative and term averages. Cumulative and term averages will be calculated to two decimal places and rounded to the nearest whole number with .45 rounded up, for the purposes of admission to and progression in modules, scholarship retention, and Dean's Honour List.

Policy: [Marks/Grades; Definitions of Grades; Grading Scale for Undergraduate Students](#)

16. Support Services

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

Statement on Gender-Based and Sexual Violence

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 the following website:

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.

Other important links:

- [Academic Advising \(Science and Basic Medical Sciences\)](#)
- [Learning Development and Success](#)
- [Office of the Registrar](#)
- [Wellness & Wellbeing](#)
- [Western USC Services](#)

Appendix 1: Western University Academic Policies and Procedures

The policies and procedures listed in this syllabus are outlined in the table below. In some cases, a policy does not include an accompanied procedures document.

Academic Policy	Name of Policy/Procedure	Links
General Policy	Marks/Grades; Definitions of Grades; Grading Scale for Undergraduate Students	Policy
General Policy	Structure of the Academic Year	Policy
Registration, Progression, Graduation	Course Numbering Policy, Essay Courses, and Hours of Instruction	Policy
Registration, Progression, Graduation	Undergraduate Course Credit	Policy • Procedures
Examinations	Definitions of Types of Examinations	Policy
Examinations	Evaluation of Academic Performance	Policy
Examinations	Examination Conflicts	Policy
Rights and Responsibilities	Academic Accommodation for Students with Disabilities	Policy
Rights and Responsibilities	Accommodation for Religious Holidays	Policy

Rights and Responsibilities	Policy on Academic Consideration – Undergraduate Students in First Entry Programs	Policy • Procedures
Rights and Responsibilities	Requests for Relief from Academic Decisions (Undergraduate)	Policy • Procedures
Rights and Responsibilities	Requests for Relief from Academic Decisions (Graduate)	Policy • Procedures
Rights and Responsibilities	Scholastic Offences (Undergraduate)	Policy • Procedures
Rights and Responsibilities	Senate Review Board Academic Appeals	Policy • Procedures