

Calendar Description

An examination of statistical issues aiming towards statistical literacy and appropriate interpretation of statistical information. Common misconceptions will be targeted. Assessment of the validity and treatment of results in population and scientific media. Conceptual consideration of study design, numerical and graphical data summaries, probability, sampling variability, confidence intervals and hypothesis tests.

Prerequisites: none

Anti-requisites: Statistical Sciences 1023A/B

You may not receive credit if you lack a pre-requisite OR have taken an anti-requisite course. Unless you have either the requisites for this course or written 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.

Course Information

Stat 2037A is a 'blended' course; this means that course material will be integrated across two delivery formats: online (videos, readings, quizzes, simulations) and in class ('face-to-face'). Students should expect to complete substantial independent study tasks on their own time each week, **AND** attend a face-to-face class to cover other course material and/or participate in activities and discussions. Note that it will be insufficient to *only* attend class or only cover the online material.

Face-to-Face sessions (listed as 'Tutorial' on course timetable): Tuesdays, 1:30 to 3:30 pm, UCC 56.

Instructor Information

Lecturer	Jennifer Waugh
Departments	Biology <i>and</i> Statistical & Actuarial Sciences
Drop-in hours*	Wednesdays, 1:00 pm–3:00 pm in Collip 114
Email	Use OWL messages <i>only</i> (contact 'Instructor Role') - not UWO email

*Any additional help sessions or drop-in hours before tests/exams, as well as any change to regular drop-in hours (these may need to be rescheduled from time to time), will be posted to OWL announcements. Please note that individual appointments will not be scheduled outside drop-in hours unless you have *direct timetable conflicts* with the entire drop-in period.

Communicating with the Instructor

Use the OWL Messages (to '**Instructor Role**') tool when asking a personal administrative question (i.e. confidential questions about marks, participation, progress, absences, etc.) that requires a brief response; course content related questions or non-personal questions should be posted to the OWL Forums. You can expect a response to an OWL message to the instructor or a posting to the Forum within ~48 hours during the work week (during busy times, it may take a little longer). **Note that Messages or Forum**

questions will not be answered within the 24-hour period before the tests or exams, nor can I guarantee responses over weekends/holidays. This 'black-out' period is not meant to be punitive; it is meant to encourage students to be proactive in seeking help and preparing for assessments.

Students are responsible for checking OWL (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

Course Objectives

By the end of this course, it is my hope that you will:

- Understand and correctly use foundational vocabulary associated with statistics;
- Interpret, create (with the aid of suitable applets), and critically evaluate graphical and numerical summaries;
- Understand and appreciate probability, chance, randomness, and 'average';
- Understand, assess, and critique the validity of conclusions of statistical studies;
- Critically evaluate statistical information presented in the media and society;
- Apply concepts learned in this course to future courses, careers, and everyday life.

Required Materials

Utts, JM. 2015. Seeing through statistics, 4th edition. Brooks/Cole, Cengage Learning.

Students will be expected to read required sections for the textbook as part of the independent study component of the course; note that this does not require a student to purchase their own copy. There are several copies of the textbook available on course reserve at Taylor Library for your use. More information about textbook use in this course is available on the OWL course site under 'Administration'.

Important Information

1. **If you would like to make an audio recording of the lectures/tutorials in this course, you MUST ask permission first (through OWL Messages sent to 'Instructor Role').** According to intellectual property laws, not asking permission constitutes stealing. I will **NOT** permit videotaping lectures under any circumstances.
2. **Course material (i.e. lecture slides, videos, quizzes, practice, and actual exam questions and other supplementary material posted on OWL) is the intellectual property of your instructor and is made available to you for your personal use in this course.** Sharing, posting, selling, or using this material outside *of your personal use in this course* is considered an infringement of intellectual property rights. Outline lecture slides will be posted in .pdf format, 1 slide per page only, no later than 11:59 pm the night before lecture. Alternative file formats will not be available. ***Note that complete PowerPoint slides used in class will NOT be posted or distributed in any form under any circumstances.***
3. **The Forum tool is enabled on the OWL website.** Please use this Forum to post and respond to questions about course content (e.g., lecture, readings, practice questions, etc). The Forum will be monitored on a regular basis and the instructor will interject with corrections or responses as necessary. As this is an open Forum, please be respectful of your peers, instructor(s), and TAs. Derogatory, discriminatory, or otherwise inappropriate language or topics will be removed and dealt with at the instructor's discretion.

Assessment and Evaluation

Your final grade will automatically be calculated to give you the **highest mark possible** based on the following grade breakdown:

Course Component	Weight	Deadlines/Due Dates
Course Structure Quiz	1%	Available online Sept. 7 to Sept. 18 (at 11:59 pm)
Preparation Quizzes	6%	Watch for deadlines on OWL
Surveys	2%	Watch for deadlines on OWL
Assignment 1	6%	Friday, Nov. 10 at 4:00 pm
Assignment 2	6%	Friday, Dec. 1 at 4:00 pm
No-Risk In-class Assessment 1*	3%	Tuesday, Oct. 3, 1:30 pm - 1:55 pm
No-Risk In-class Assessment 2*	3%	Tuesday, Oct. 24, 1:30 pm – 1:55 pm
No-Risk In-class Assessment 3*	3%	Tuesday, Nov. 21, 1:30 pm – 1:55 pm
Low-Risk Midterm*	25%	Saturday, Nov. 4th, 10:00 am - 12:00 noon
Final Exam*	45%	During December exam period (Dec 10-21)

*see information below regarding the 'No Risk' and 'Low-Risk' aspects of these course components.

Course Structure Quiz: A quiz administered through OWL Test & Quizzes, assessing understanding of course policies and structure as described in this course syllabus and the OWL course website. More detailed information about structure and content of this quiz is provided on the course website. *No accommodation* will be made after the deadline for any reason (e.g., technical problems or late registration in the course); attempt the quiz early during the availability period so that any problems that arise can be dealt with before the deadline.

Preparation Quizzes: Short quizzes administered through OWL Test & Quizzes, assessing understanding of assigned content from the textbook, internet, lecture videos, or other resources provided on OWL. More detailed information about structure and content of each quiz will be provided on the course website as the quizzes become available. *No accommodation* will be made after the deadline for each quiz for any reason (e.g., technical problems); attempt the quiz early during the availability period so that any problems that arise can be dealt with before the deadline.

These quizzes are incorporated into the course to:

- (i) encourage students to actively complete and engage with the independent study material (online component) of the course on a regular schedule;
- (ii) review previous course concepts that will be drawn upon during Face-to-Face sessions;
- (iii) provide students with feedback on their understanding of fundamental concepts from the independent study component.

*The preparation quizzes are **not** intended to represent the level of difficulty or comprehension involved in in-class assessments, midterm, or exams.*

Quizzes are graded for correct answers; a student's individual mark on a quiz will equal the number of 'points' collected towards the Preparation Quiz mark. At the end of the course, the total number of 'points' a student has accumulated will be tallied, and expressed as a percentage out of the total number of points 'offered' across all quizzes presented during the course. This percentage of points collected by the student will

Points collected (% total offered)	Final Preparation Quiz Mark (/5%)
0	0
0 < % answered < 17	1
17 ≤ % answered < 33	2
33 ≤ % answered < 50	3
50 ≤ % answered < 67	4
67 ≤ % answered < 83	5
83 ≤ % answered ≤ 100	6

be used to determine the student's final Preparation Quiz mark for the course, using the conversion scheme presented in the table above.

Surveys: Brief questionnaires administered through OWL Test & Quizzes, typically involving no (or minimal) previous knowledge of course material or statistics. The purpose of these Surveys is to collect data to be discussed or analyzed during Face-to-Face sessions. Surveys are graded based on completion with reasonable/logical responses, rather than for correct answers. More detailed information about structure and content of each Survey will be provided on the course website as they become available. Note that the majority of the Surveys will be administered early in the term. *No accommodation* will be made after the deadline for each Survey for any reason (e.g., technical problems).

Each Survey will be assigned a specific number of 'points' (generally based on the number of questions involved) for students to collect. At the end of the course, the total number of 'points' a student has accumulated will be tallied, and expressed as a percentage out of the total number of points 'offered' across all Surveys presented during the course. This percentage of points collected by the student will be translated directly into the student's final Survey mark (out of 2%) for the course.

Assignments: Two (2) short, written assignments involving application and analysis of course material will be assigned during the course, and collected using the 'Assignments' tool on the OWL course site. Detailed instructions on the structure, grading scheme, and submission process for the assignments will be posted on the OWL site. There will be no assignment extensions or make-up assignments for any reason. If you are unable to submit an assignment by the due date/time, you must obtain accommodation from Academic Counseling in your Faculty's Dean's Office; those students obtaining such accommodation will have the weight(s) of the missed assignment(s) shifted to the final exam. Failure to obtain academic accommodation for a missed due date will result in a grade of 0% for the Assignment(s).

No-Risk In-class Assessments: There will be three (3), multiple choice, roughly exam-level difficulty In-class Assessments administered throughout the course (see the course schedule on the last page of this syllabus for dates). The assessments will be completed using IFaT cards ("Immediate feedback assessment technique" scratch cards) during class time, at the start of lecture. More detailed information about structure and content of each Assessment, as well as information about using IFaT cards, will be provided on the course website. These In-class Assessments are subject to the 'Flexible Grading' scheme presented below; as a result, there are no make ups or accommodations for absences for students who miss the In-class Assessments (for any reason). The Assessments

Low Risk Midterm: One cumulative multiple-choice (Scantron based) *and* short-answer questions midterm will be administered in person, outside of class time during the term. This midterm assesses understanding and application of course material (from both Independent Study and Face-to-Face sessions). More detailed information about structure and content of this midterm will be provided on the course website. Students who miss the Midterm must request accommodation from Academic Counseling in their Faculty's Dean's Office. Students who obtain appropriate accommodation may be eligible for an alternative seating of the Midterm.

Final Exam: The Final Exam is a *cumulative*, 3-hour multiple choice (Scantron based) *and* short-answer questions exam assessing understanding, application, and integration of course material (from both Independent Study and Face-to-Face sessions) across the entire course. More detailed information about structure and content of these tests will be provided on the course website. The exam will be held during the official final exam period and will be scheduled by the Registrar's Office. **Do not book travel (or other plans) during this exam period until the exam schedule is finalized by the Registrar's Office.**

Additional comments on assessments

Flexible grading

The No-Risk In-class Assessments (“ICA”), Low-Risk Midterm, and Final Exam have flexible weightings, dependent on your success for each component. Each assessment is initially worth a set amount of your final grade (see table on page 3). Eight (8) scenarios have been provided for how the weights of the In-class Assessments will be allocated. For each of the eight scenarios, there are also two options (A or B) for the weight of the Low-Risk Midterm and Final Exam. Your final course grade will **automatically** be calculated under each of the following scenarios for both options A and B (i.e. your final course grade will be calculated 16 different ways); whichever scenario/option combination gives you the highest final course grade will be used when submitting your course grade:

	Item	S1	S2	S3	S4	S5	S6	S7	S8
	ICA 1	3%	0%	3%	3%	0%	0%	3%	0%
	ICA 2	3%	4.5%	0%	3%	0%	5%	0%	0%
	ICA 3	3%	4.5%	4.5%	0%	5%	0%	0%	0%
A	Low-Risk Midterm	25%	25%	26.5%	25%	29%	26%	28%	31%
	Final Exam	45%	45%	45%	48%	45%	48%	48%	48%
B	Low-Risk Midterm	12%	12%	12%	12%	14%	13%	14%	15%
	Final Exam	58%	58%	59.5%	61%	60%	61%	62%	64%

The purpose behind the Flexible Grading scheme is to provide you with the entire term to demonstrate your mastery of the material and skills. That is, if you are not as successful as desired on earlier assessments, their individual weightings can be reduced (as described in the above Scenarios), and the remaining weights be placed on later assessments (e.g. Final Exam). These alternative distributions are possible because all assessments in this course are cumulative.

General comments

Non-programmable calculators are permitted for use during all graded components of the course. No other aids are allowed (unless otherwise noted). **Cellular phones, iPods, and other similar technology are not permitted in the midterm/exam rooms.** This means that cellular phones, iPods, and other similar technology **cannot** be used as a timekeeper/clock, calculator, or for any other purpose.

It is Faculty of Science policy that a student who chooses to write a test or exam deems themselves fit enough to do so, and the student must accept the mark obtained. Claims of medical, physical, or emotional distress after the fact will not be considered.

The Course Structure Quiz, Preparation Quizzes, Surveys, In-Class Assessments, Assignments, Low-Risk Midterm, and Final Exam will **not** be re-weighted to accommodate perceived poor performance on any assessment in this course, nor for any absence(s) for which accommodation has not been recommended by Academic Counseling. Additional assignments will **not** be accepted in lieu of a missed or lost graded component, or to account for perceived poor performance on any graded component of this course.

No special rounding rules (e.g. to meet GPA cut-offs, minimal requirements for programs/continuation, etc.) are applied in this course when calculating final grades. There are **no** exceptions to this policy.

Policy for missed Tests/Exams

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in WSC 140, and can be contacted at scibmsac@uwo.ca.

For further information, please consult the university's medical illness policy at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

If you miss the Final Exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

Specific Statistics 2037 policy on accommodation: In addition to providing documentation to your Academic Counselling office (as described above), please notify the instructor by OWL message to 'Instructor Role' immediately of your absence or expected conflicts with tests/deadlines. Do **not** include details of *why* you will be/were absent—that is confidential information shared only with the Counselling office; simply indicate that you will/were absent for the course component, and that you are taking necessary steps to contact your Academic Counselor. Students who miss an assessment and do **not** receive appropriate accommodation from their Dean's Office will be awarded a '0' for the assessment. There are no exceptions to this policy.

Classroom Environment

The Department of Statistical and Actuarial Sciences has adopted a "Mutual Expectations" policy governing the classroom environment and all work submitted by students. The full text of the policy can be found at: <http://www.uwo.ca/stats/undergraduate/mutual-expectations.html>. In summary, the policy was developed under the premise that all interactions between students and faculty should be governed by the principles of courtesy, respect and honesty.

Academic Policies

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

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, 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.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at this website: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

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

During tests/exams, proctors will inspect all personal belongings on your desk (and even your baseball cap if you are wearing one). If any items are discovered that are not permitted (e.g. any electronic device other than a non-programmable calculator, or notes) they will be confiscated and the incident will be officially reported as an academic offence. Proctors have the discretion to move students between desks during the Tests or Exam periods.

Support Services

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 ext. 82147 if you have questions regarding accommodation.

The policy on Accommodation for Students with Disabilities can be found here: www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_disabilities.pdf

The policy on Accommodation for Religious Holidays can be found here: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.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.

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

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

Clicker Use in this Course

A “clicker” is a browser page or ‘app’ opened on a personal WiFi device (e.g. a smartphone, tablet, or laptop). In class, instructors can ask a variety of structured questions to which you may respond by pressing the appropriate button on your device. Individual responses are collected and summarized in a graph at the front of the room. If the instructor chooses, individual responses may also be saved for future analysis. In 2037, clickers will be used primarily to promote engagement and evaluate student understanding during class; no grades will be attached to participation with a clicker.

Clicker Responsibility: We subscribe to and use clicker software produced by iClicker (<https://www.iclicker.com/>) because it is the company supported by the Western’s technology services. A student choosing to use a clicker will be responsible for (a) bringing their own device to use as a clicker, and (b) setting up their iClicker account correctly (see information on OWL).

Clicker Academic Record: Your clicker use will be recorded in lecture and will become part of your academic record. As such, your clicker record will be afforded the same degree of security, confidentiality and transparency that is customary for test marks, etc.

Research: Your clicker data will not be used for any non-academic or research purpose without your consent. For any research study in which you are invited to participate, you will be provided with a Letter of Information with an opportunity to give or withhold consent. Such research will not replace the usual end of term Course Evaluation given by the University.

Course Schedule

This is a tentative schedule for the course. Watch OWL announcements and in-class announcements for any important updates to the course schedule. *IS* = independent study; *F2F* = Face-to-face session

Week	Topic(s)	Important Dates/Reminders
Sept 4-8	<i>No class for Stats 2037</i>	
Sept 11-15	<i>F2F</i> : Introduction to course, statistics, and data <i>This is not just a typical 'introductory' class; we will engage in meaningful discussion that will set the tone for future activities. Please attend.</i>	
Sept 18-22	Summarizing Data I <i>IS</i> : Measures of shape, centre, & spread; 5-number summary <i>F2F</i> : Interpreting & evaluating descriptive statistics	Mon, Sept 18 : Course Structure Quiz
Sept 25-29	Summarizing Data II <i>IS</i> : normal distributions & standardized scores; graphical summaries <i>F2F</i> : applying the empirical rule; misleading graphs	
Oct 2-6	Sampling Strategies and Study designs <i>IS</i> : vocabulary and designs for sampling & studies <i>F2F</i> : selection bias, confounding, & principles of experimental design	Tues, Oct 3 : In-class Assessment 1
Oct 9-13	<i>Fall Reading Week (no classes)</i>	
Oct 16-20	Survey design <i>IS</i> : variation and surveys <i>F2F</i> : measurement bias; catch-up from Sampling and Study Design	
Oct 23-27	Research Ethics <i>IS</i> : introduction to core Canadian principles and consent in ethics <i>F2F</i> : issues with consent and equity	Tues, Oct 24 : In-class Assessment 2
Oct 30-Nov 3	Relationships between quantitative variables <i>IS</i> : correlation coefficient; linear regression models <i>F2F</i> : interpreting correlations & regression	Sat, Nov 4 : Low-Risk Midterm
Nov 6-10	Relationships between qualitative variables <i>IS</i> : introduction to two-way tables, risks, & odds <i>F2F</i> : interpreting and working with risks & odds statements	Fri, Nov 10 : Assignment 1 due
Nov 13-17	Understanding randomness & probability <i>IS</i> : interpretation of probability, expected value <i>F2F</i> : Understanding randomness and working with probability rules	
Nov 20-24	Introduction to inference & interpreting confidence intervals <i>IS</i> : Sampling variability & sampling distributions <i>F2F</i> : properties of sampling distributions; confidence intervals	Tues, Nov 21 : In-class Assessment 3
Nov 27-Dec 1	Hypothesis testing and significance <i>IS</i> : Hypothesis testing vocabulary & process <i>F2F</i> : Chips Ahoy! Hypothesis test; power, effect size, type I/II errors	Fri, Dec 1 : Assignment 2 due
Dec 4-8	Capstone: Critiquing Statistics in the media <i>IS</i> : Seven critical components <i>F2F</i> : Application of seven critical components; catch up from previous week	
Dec 10-21	<i>December Final Exam Period</i>	