BIOLOGY 2244B—Analysis & Interpretation of Biological Data

and

STATISTICS 2244B—Statistics for Science

Winter 2018

Calendar Descriptions

Stat 2244: An introductory course in the application of statistical methods, intended for honors students in departments other than Statistical and Actuarial Sciences, Applied Mathematics, Mathematics, or students in the Faculty of Engineering. Topics include sampling, confidence intervals, analysis of variance, regression and correlation. Cannot be taken for credit in any module in Statistics, Actuarial Science, or Financial Modeling.

Biol 2244: Measurement, sampling, estimation, and statistical hypothesis testing are considered: theory, intuitive background, and practical relevance will be stressed.

Note: Students registered in 2244 under 'Biology 2244' will have the course listed as 'Biology 2244' (and the associated course title) on their transcript; those registered under 'Statistics 2244' will have the course listed as 'Statistics 2244' (and the associated course title). The naming of the course is set once a student registers and will not retroactively be changed past the add/drop deadline for the term of registration.

Prerequisites: A full mathematics course, or equivalent, numbered 1000 or above. Statistical Sciences 1024A/B can be used to meet 0.5 of the 1.0 mathematics course requirement.
Anti-requisites: All other courses or half courses in Introductory Statistics **except** Statistical Sciences 1023A/B, Statistical Sciences 2037A/B and Statistical Sciences 1024A/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

Lectures: Sect 001: Wed and Fri, 12:30 pm–1:30 pm in SSC 2050
Sect 002: Tues and Thurs 3:30 pm–4:30 pm in AHB 1R40

Labs:

Section	Day	Time	Location
003	Tu	6:30–9:20 pm	HSB 16
004	Tu	6:30–9:20 pm	NCB 105
005	W	6:30–9:20 pm	HSB 14
006	W	6:30–9:20 pm	HSB 16
007	W	6:30–9:20 pm	NCB 105
008	Th	6:30–9:20 pm	HSB 13
009	Th	6:30–9:20 pm	HSB 14
010	Th	6:30–9:20 pm	-
011	Tu	1:30–4:20 pm	HSB 13
012	W	1:30–4:20 pm	HSB 16
013	Th	6:30–9:20 pm	NCB 105
014	Tu	1:30–4:20 pm	HSB 14
015	F	11:30 am – 2:20 pm	HSB 16

Instructor Information

Lecturer	Jennifer Waugh
Departments	Biology *and* Statistical & Actuarial Sciences
Drop-in hours*	Mondays, 10:00 am–12:00 noon in NCB 301L Thursdays, 9:30 am–11:30 am in NCB 301L
Email Contact	Use OWL messages *only* (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 *both* time periods in their entirety.

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 2244 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, a successful student will be able to:

- Recognize, select, and evaluate different data collection procedures (i.e. sampling and study designs),
- Select, calculate, interpret, and critically evaluate numerical and graphical summaries of data,
- Select, conduct, interpret, and critically evaluate statistical inference procedures,
- Use statistical software (R and R Studio) to summarize, interpret, analyze, and communicate data,
- Critically evaluate, and properly communicate statistical information,
- Apply concepts learned in this course to future courses, careers, and everyday life.

Required Materials

Baldi, B. and DS. Moore. 2013. *The Practice of Statistics in the Life Sciences.* 3rd Edition, W.H. Freeman and Company.

The textbook is available at the UWO bookstore in **ebook** (i.e. 12-month subscription to online, 2244-customized resources, including an electronic copy of the textbook, referred to as the '***Launchpad Etext Access Code for Practice of Statistics***') or printed options (hardcover or binder formats). I "*require"* the ebook version because I have collected assigned readings into Pre-Lecture reading 'units' to prepare you for lectures (printed versions can't be manually organized this way). You will have frequent quizzes based on these units (see more information about preparation quizzes below). One of the other benefits of using the ebook version is that it shows instructor annotations directly on the text pages; these annotations provide clarification of common issues in the textbook/with statistics, identify sections that can be skipped, or highlight content that we approach differently in the course. Note that, if you prefer to purchase a printed book from the Bookstore, a Launchpad access code is automatically included. Several copies of the hardcover textbook are also available on reserve in Taylor library.

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.
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 two grade breakdowns, based on whether clicker participation is incorporated or not:

Course Component	With Clickers	Without Clickers	Deadlines/Due Dates
Course Structure Quiz	1%	1%	Available online Jan. 9 to Jan. 18 (at 11:59 pm)
Clicker Participation	5%	0%	During lecture, starting Jan 11/12
Preparation Quizzes	5%	5%	Watch for deadlines on OWL
Online Assessment	3%	3%	Available online Feb. 27 – Feb. 28 (at 11:59 pm)
5 Lab Assignments	17% total	22% total	Starting the week of January 22;
Highest lab	*5%*	*6%*	Labs do not happen every week; see course
2nd & 3rd highest labs	*4% each*	*5% each*	schedule (p.10) for lab weeks
4th & 5th highest labs	*2% each*	*3% each*	
Preparation lab	*1% bonus*	*1% bonus*	
No Risk Test 1*	10%	10%	Friday, Feb 9th, 7:00 - 8:00 pm
No Risk Test 2*	14%	14%	Saturday, March 17th, 4:00 pm - 6:00 pm
Final Exam*	45%	45%	During April exam period (Apr 14-30)

*see information below regarding the 'No Risk' aspect and weightings of Tests 1 and 2, and the Final Exam.

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.

Clicker Participation: Clickers will be used in every lecture. For your clicker participation to be counted, you must review the information on OWL under Course Materials/Administration/Clicker Registration and Setup to be sure you have set up, and use your 'clicker' properly**.** There will be 'trial' classes at the very start of the term to familiarize yourself with using a clicker in 2244.

Multiple clicker questions will typically be asked during class. The proportion of questions that you answer will determine the fraction of the available clicker participation grade (5%) that you earn, as shown in the table at right. Classes may vary in the number of questions asked; however, in computing final clicker participation grades, each class will be weighted equally (for example, if you miss a 5-question class, you won't be missing more toward your clicker grade than if you missed a 2-question class instead). *For a given lecture, you can earn credit for answering clicker questions in either lecture section (i.e. it doesn't need to be the section you are officially registered in), but not both (lectures are typically paired across sections as Tues/Wed and Thurs/Fri, although the holiday at the end of March disrupts this pairing).*

% Questions answered	**Final Clicker Mark** (/5%)
0	0
0 < % answered < 20	1
20 ≤ % answered < 40	2
40 ≤ % answered < 60	3
60 ≤ % answered < 80	4
80 ≤ % answered ≤ 100	5

Clicker participation only requires that you try; you do not have to get the questions right to get this part of your course grade. Notice that you can miss up to 20% of the clicker questions for any reason without affecting your grade; this 'buffer' accounts for any technical/WiFi problems that may arise during the course, as well as days on which you forgot your device or had to miss all or part of a lecture. Please note that no accommodation will be made for missed clicker participation or incorrectly registered clickers. Your clicker participation mark will be calculated based solely on the data in class records.

Refer to the "Use of Clickers in this Course" section toward the end of this document for further details about Clicker use.

Preparation Quizzes: Short quizzes administered through OWL Test & Quizzes, assessing understanding of assigned content from the textbook/LaunchPad and/or material posted to 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. Quizzes are typically available for a couple days (2-3 days).

These quizzes are incorporated into the course to:

(i) encourage students to actively complete and engage with the course material on a regular schedule;
(ii) review new and previous course concepts that will be drawn upon during upcoming lectures;
(iii) provide students with regular feedback on their understanding of fundamental course concepts.

*These quizzes are **not** intended to represent the level of difficulty or comprehension involved in labs, tests, or exams; they are testing for foundational knowledge and understanding only.*

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 (during previous course offerings, the total points offered across the term was approximately 50; this term may be slightly more or less). This percentage of points collected by the student will be used to determine the student's final Preparation Quiz mark for the course, using the conversion scheme presented in the table above.

Points collected (% total offered)	**Final Preparation Quiz Mark (/5%)**
0	0
0 < % answered < 20	1
20 ≤ % answered < 40	2
40 ≤ % answered < 60	3
60 ≤ % answered < 80	4
80 ≤ % answered ≤ 100	5

Online Assessment: A short online Assessment administered through the OWL 'Tests & Quizzes' tool, assessing understanding and application of important course concepts from the beginning of the course. More detailed information about structure and content of this Assessment will be provided on the course website. Students will have two (2) attempts at the Assessment (with different questions); consequently, *no accommodation* will be made for technical issues, conflicts, etc. and no make ups Assessments will be provided. Students who fail to complete the Assessment *but do* receive academic accommodation from an academic counselor covering the *entire* availability period will be accommodated by having the weight of the Assessment (3%) shifted to the Final exam.

Lab Assignments: Lab assignments are completed in person during regularly scheduled lab periods (see the course schedule for details on lab schedule), and are submitted through OWL Tests & Quizzes for marking; labs are designed to assess student understanding and application of course materials, as well as to teach and assess student use of statistical software (R and R Studio). Occasionally, marked components of the Lab assignment may need to be completed **in advance** of Lab (using the OWL 'Tests & Quizzes') tool; information will be posted on OWL in these situations. Lab assignments must be submitted by **2 hours and 50 minutes** into the lab period (i.e. in time for class change); no extensions will be provided. More information about the structure, content, and policies for Labs is provided on the OWL course site.

To earn full credit for a lab assignment, students must:

- attend their registered lab section. No section switching (for make-ups, conflicts, or any other reason) is permitted.
- Sign the attendance sheet in the first 10 minutes of their lab period. Students signing the attendance sheet late, but before 30 minutes into the lab period will receive a 20% deduction in their lab mark. Students attempting to sign the attendance sheet more than 30 minutes into lab period or not at all will have a mark of zero (0) recorded for that assignment—regardless of whether they submit the assignment or not.

Labs are required for successful completion of this course. Because using statistical software is one of the learning outcomes for this course, students must attend, complete, and receive a grade for a ***minimum*** of three (3) lab assignments (not counting the Preparation Lab) to earn credit for this course. For any missed lab, students must obtain recommendation for academic accommodation from Academic Counselling in the Dean's Office, otherwise a grade of zero (0) will be awarded for the missed lab. Up to two (2) missed and accommodated labs will have their weighting(s) (starting with the lowest weighting) calculated as the average mark for the other three completed lab assignments. If more than two (2) labs are missed with appropriate accommodation, the student will be issued a course grade of 'incomplete' and will be required to make up the remaining missed labs in the next offering of the course. ***No accommodation*** will be granted for the 1% bonus if the Preparation Lab is missed for any reason.

Lab exemptions for repeating students: Students who are repeating Biology/Statistics 2244 (i.e. have taken 2244 as either Biology 2244A, Biology 2244B, Statistics 2244A, or Statistics 2244B any term starting with the **Fall 2014 term (i.e. Sept 2014 or more recent)** are eligible for a lab 'exemption' (this means that students who took the course *before* Fall 2014 are not eligible for the exemption). Eligible students who are repeating the course have the option of using their lab grades (all Assignments 1 to 5) from the previous time they took the course as their grades for the five individual lab assignments (plus Preparation Lab bonus if applicable) for this current term (this is an 'all or nothing' exemption). Information about the Lab exemptions is provided on the OWL course site, including a form that eligible students must complete before the first lab assignment to register their exemption status.

No Risk Tests 1 and 2: Two (2) multiple choice, Scantron-based tests will be administered in person, outside of class time during the term. These tests assess understanding and application of course material (including Lab content where applicable). More detailed information about structure and content of these tests will be provided on the course website. These Tests are considered 'No Risk' because of how final course grades will be calculated. Each 'No Risk' Test is initially worth a fraction (i.e. 10 or 14%) of your final grade. However, your final course grade will ***automatically*** be calculated under each of the following scenarios; whichever scenario gives you the highest final course grade will be used when submitting your course grade:

Item	Scenario 1	Scenario 2	Scenario 3	Scenario 4
No Risk Test 1	10%	0%	10%	0%
No Risk Test 2	14%	19%	0%	0%
Final Exam	45%	50%	59%	69%
Description:	Standard distribution of test marks	Redistribution of Test 1 weight: half to Test 2, half to Final Exam	Redistribution of Test 2 weight: all 14% to Final Exam	Redistribution of Tests 1 and 2 weights: all 24% to Final Exam

The purpose behind the No-Risk Tests is to provide you with two opportunities during the course for feedback on your understanding of course material under exam-style conditions. Making them 'No Risk' means that—if you discover that your understanding is not complete or you perform below your desired level of success during the Test(s)—you still have another opportunity to improve on your achievement for that component of the course grade on the next Test and/or Final Exam (i.e. after you seek additional help/clarification to improve your mastery of the material). Because all assessments in this course are cumulative, the relative weighting of 'early' versus 'late' course material will be approximately equivalent under each scenario.

*Note that there are **no** make-up tests nor accommodations for absences for the 'No Risk' Tests. If you have a conflict with the Test time(s) or miss one/both Tests for any reason, you do **not** need to obtain documentation or request accommodation for your absence. Your grade will automatically be calculated under all four scenarios and the highest grade will be submitted at the end of the course.*

Final Exam: The Final Exam is a *cumulative*, 3-hour multiple choice, Scantron-based exam assessing understanding, application, and integration of course material (including Lab content) across the entire course. More detailed information about structure and content of the exam 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.**

Comments on Assessments

Non-programmable calculators are permitted for use during all graded components of the course (including the No-Risk Tests, and Final Exam). No other aids are allowed. **Cellular phones, iPods, and other similar technology are *not* permitted in the test/exam room.** 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.

None of the components of this course will be re-weighted (beyond what is described in this syllabus) nor will additional assignments be accepted to accommodate perceived poor performance on an assessment item, or for absence(s) for which accommodation has not been recommended by academic counseling. 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 these policies.

Assigned readings

A complete list of assigned material from the textbook resources is posted on the course website for each course topic; students are expected to complete all assigned material. Note that '*assigned*' means students are expected to read and understand the material contained within the reading. While some of the material may be discussed in lecture, this is not guaranteed. All assigned reading material (i.e. that tested on Preparation Quizzes, as well as other assigned material from each lecture topic) is testable on the Labs, Quizzes, Online Midterm Assessment, Tests, and Exams, unless otherwise noted. Be sure to review the Instructor Annotations as you progress through the assigned material.

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).

Students who miss a graded component in this course and do **not** receive appropriate accommodation from their Dean's Office will be awarded a '0' for that component unless otherwise described above. ***This applies to the Labs, the Online Assessment, and the Final Exam. Refer to the above descriptions of the other 2244 assessment components for exceptions to this policy (i.e. 'No Risk' Tests, clicker participation, preparation quizzes, etc.)***

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.stats.uwo.ca/modules/undergraduate/index.php?id=12. 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 2244, clickers will be used primarily to promote engagement and evaluate student understanding during class. They will also provide you with credit and feedback on your lecture preparation and/or participation. The information below provides further details.

Clicker Responsibility

For Biol/Stat 2244, we subscribe to and use clicker software produced by iClicker (https://www.iclicker.com/) because it is the company supported by 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 the OWL course website). Note that the course and instructor is also not responsible (and therefore, no accommodation will be made) for WiFi failure.

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 Student Questionnaire given by the University.

Academic Integrity

Use of a clicker associated with an identity other than your own is an academic offense. Granting permission for someone else to submit answers on your behalf in your absence is an academic offence. In a test, lab, lecture, or tutorial, possession of more than one clicker device, or one associated with the UserID/Device ID of another student, will be interpreted as intent to commit an academic offense and will be reported as such. ***This means that it will be considered an academic offense to answer a clicker question with using an account other than your own.***

Course Schedule

This is the tentative schedule for course topics: some adjustments may be made as the course progresses, depending on the rate at which individual topics are covered. At certain points during the term, you will be responsible for covering some course material on your own time (e.g. through readings or posted videos/resources). Lab topics (e.g. 'Probability and Distributions') are tentative and may change depending on rate of progress through course material, but the dates of the lab weeks will be as described below. Note that labs only occur on the weeks described below (Preparation Lab plus 5 Labs). ***Preparation Quiz dates and topics are very tentative and subject to change**, based on progression through course topics.*

Week	Topic(s)	Important Reminders/ Due Dates
Jan 8-12	Introduction to course Sampling Strategies	Clicker trial day: Jan 9 & 10 Clicker Participation starts counting Jan 11 & 12 *Preparation Quiz: Sampling Strategies*
Jan 15-19	Study Designs Descriptive Statistics	Course Structure Quiz due: 11:59 pm on Jan 18 Lab exemption form due: 11:59 pm on Jan 18 *Preparation Quiz: Study Design* *Preparation Quiz: Descriptive Statistics*
Jan 22-26	Descriptive Statistics, continued. Probability and randomness	*Preparation Quiz: Probability* **Preparation Lab (1% bonus)** during lab periods
Jan 29-Feb 2	Binomial Probability Model Normal Probability Model	*Preparation Quiz: Binomial Distributions* *Preparation Quiz: Normal distributions* **Lab 1:** Descriptive Statistics
Feb 5-9	Normal Probability Model, continued. Sampling Distributions	*Preparation Quiz: Sampling distributions* **No Risk Test 1 (10%):** Fri., Feb. 9, 7:00 pm – 8:00 pm
Feb 12-16	Introduction to confidence intervals Z confidence interval for μ	*Preparation Quiz: introduction confidence intervals* *Preparation Quiz: confidence intervals for means* **Lab 2:** Probability models
Feb 19-23	***Reading week (no classes)***	
Feb 26-Mar 2	t confidence interval for μ Approx. Z confidence interval for *p*	*Preparation Quiz: confidence interval for p* **Online Assessment (3%) due:** 11:59 pm on Feb 28
Mar 5-9	Introduction to hypothesis Testing Approximate Z-test for *p*	*Preparation Quiz: Introduction to hypothesis testing* *Preparation Quiz: tests for p* **Lab 3:** Confidence Intervals
Mar 12-16	t-test for μ Two-sample inference for means	*Preparation Quiz: two-sample inference* **No Risk Test 2 (14%):** Sat., Mar. 17, 4:00 pm–6:00 pm
Mar 19-23	Two-sample inference for $p_1 - p_2$ (*Independent Study)* Correlation *(Independent Study)* Linear (Type I) Regression	*Preparation Quiz: Regression* **Lab 4:** Hypothesis Testing
Mar 26-30	Linear (Type I) Regression (cont'd)	*Preparation Quiz: Independent Study Topics* ***No class on Friday, March 30 (Good Friday)***
Apr 2-6	One-Factor ANOVA One-Factor ANOVA	*Preparation Quiz: ANOVA* **Lab 5:** Regression and Intro to ANOVA
Apr 9-11	Post-hoc tests	*Preparation Quiz: post-hoc tests* *Study days (no classes): Apr 12 & 13*
Apr 14-30	***April Exam Period (do not book travel during this time)***	