The University of Calgary   Academic Year 2023-2024
Bachelor of Health Sciences
Cumming School of Medicine

MDSC 407
STATISTICS AND RESEARCH DESIGN IN HEALTH SCIENCES

Instructors:

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Office Hours/Policy on Answering Student Emails
Dr. Na Li and Dr. Holodinsky will be available for office hours by appointment.

Student emails will be answered within 24 hours on weekdays. Note: attending office hours or using the D2L discussion board for course questions is preferred.

Teaching Assistant:
TBD

Time and Location:
Winter Semester: January 8 – April 9
Lectures: Mondays and Wednesdays 09:00 – 10:20. For location see D2L.

This course is delivered in a flipped format. Some course material will be delivered via online modules (including but not limited to video lectures and online readings). **Online modules must be completed PRIOR to the lecture time on the week indicated in the course schedule** (ex. Lecture 2 online modules are to be completed before attending the scheduled lecture time for Lecture 2 of the course). The online modules to be completed before lecture time are clearly marked on D2L.

In person lecture time will be highly interactive. Each lecture will begin at 9:00am with a quiz (administered via D2L) covering material from the previous lecture. Students will have 10 minutes and one attempt to complete the quiz. Promptly at 9:10am instruction for the current lecture material will begin. This will include a brief review of the pre-lecture video and example problems to help solidify key concepts. These examples will help students prepare for exams thus it is imperative that students come to class with appropriate online modules completed and participate in in-class activities. *Watching the online video modules alone will not sufficiently prepare students for exams.*

Labs: Fridays 09:00 – 10:50, 11:00 – 12:50, 13:00 – 14:50. For lab location see D2L.

Prerequisite/Co-Requisite:
Enrolment in the BHSc Honours Program

Course Description:
This course is an introduction to statistics and research design in health sciences. As a field of study, statistics consists of a set of procedures for organizing, describing, and interpreting data. Accordingly, we will focus on the theory and tools necessary to analyze data, which will be illustrated by relevant applications. The emphasis will be on statistical literacy, which is an important skill for both the analyses of health-related data and understanding and reviewing the health sciences literature.

Overarching Theme
Statistics and research design are vital components of scientific inquiry. This course aims to provide students with the necessary skills to formulate and answer research questions using basic study designs as well as appraise the use of basic study designs in the literature. The course will be delivered in two parts. The first half, delivered by Dr. Holodinsky, will focus on research design. The second half, delivered by Dr. Li, will focus on statistics.

This course is delivered in a flipped format. Lecture material is delivered via videos which must be watched before coming to class. During class students will solidify their understanding of materials through in class quizzes and examples. Students will be able to apply their new learnings in lab assignments. Finally, course concepts across the semester will be tied together in a final project.

Global Objectives
- The primary objective is for students to understand formulation of a research question, the data that are collected, the statistical analyses that should be used, and the conclusions that can be drawn.

Course Learning Outcomes

By the end of this course, students will be able to:
1. Distinguish sample level data from population level data.
2. Classify data as nominal, ordinal, interval, or ratio.
3. Explain the central limit theorem and describe its importance in biostatistics.
4. Calculate and interpret confidence intervals for means, proportions, differences in means, and differences in proportions.
5. Interpret the meaning of a given p-value.
6. Compare and contrast the results of a hypothesis test and a confidence interval.
7. Perform (both by hand and using statistical software) various hypothesis tests including t-tests, proportion tests and Chi-square tests, ANOVA, and linear regression.
8. Interpret the results of various hypothesis tests including t-tests, proportion tests and Chi-square tests, ANOVA, and linear regression.
9. Justify the choice of hypothesis test used based on the attributes of given data.
10. Describe the factors that influence power and sample size.
11. Calculate power and sample size for various types of data.

Transferable Skill Development:
Many of the skills and abilities that you are developing in your coursework are transferable to the workforce, graduate and professional studies and other facets of life. Employers seek applicants with transferable skills because they can be an asset in the workplace, regardless of industry or sector. Transferable skills are core skills for your success in building your future career.

The work that you will do in MDSC 407 will help you build the following transferable skills:

- **Collaboration**: Work respectfully with others from different backgrounds, cultures, and countries.
- **Verbal Communication**: Learn and share information by presenting, listening, and interacting with others.
- **Creativity and Innovation**: Find different and better ways to do things, being curious, thinking imaginatively.
- **Critical Thinking**: Actively and skillfully conceptualize, apply, analyze, synthesize, and/or evaluate information (data, facts, observable phenomena, and research findings) to make a reasoned judgement or draw a reasonable conclusion.
- **Digital Skills**: Use digital technologies like computers, social media, virtual meeting platforms, and the internet.
- **Information Literacy**: Find, understand, and use information presented through words, symbols, and images
- **Numeracy**: Use mathematical information such as numbers, symbols, words, and graphics to do tasks.
- **Problem solving**: Identify an issue, find and implement a solution, and assess whether the situation has improved.
- **Project Management:** Conceptualize, initiate, plan and execute a plan to achieve a predetermined goal (project) by effectively prioritizing activities and meeting deadlines.
- **Written Communication**: Share ideas and information by using words, images, and symbols.

Learning Resources
There is no required textbook for this course.

Analyses in this course will be performed using Stata Statistical Software. <u>Students will be required to have access to Stata to complete assignments in this course.</u> This software is available in the Bioinformatics Lab (HSC 1501) and on some computers the Health Sciences Library Computer Lab. However, students may wish to purchase their own copy of Stata in the event they need to be away from campus for a certain period of time. There are several purchase options through Stata, the most economical being the Student 6-month Stata/IC license (https://www.stata.com/order/new/edu/profplus/student-pricing/). If students do not wish to purchase the software, they may utilize the Bioinformatics Lab or Health Sciences Library computer lab based on personal schedules (and respecting other bookings that may occur in these rooms).

Recommended Textbooks/Readings
There is no required textbook for this course.

The following textbooks are optional references for those wishing to have a reference text. All evaluation, assignments and examples will be given in the lecture and lab notes. Those not wishing to purchase a textbook will have no disadvantage.

- o Introduction to the Practice of Statistics (9th Edition), Moore, McCabe & Craig
- o Biostatistics: A Foundation for Analysis in the Health Sciences (11th edition), Daniel & Cross

A Note regarding readings
*A list of required pre-lecture video materials will be outlined on D2L. These videos have been crafted carefully to inform you and enhance the lecture material. **Students are REQUIRED to watch assigned***

videos BEFORE each lecture. *Instructors will proceed in class on the assumption that students have watched completely the assigned videos. Students should be aware that many of the videos they will be assigned may present materials of an unfamiliar nature and style.* *Students should allot sufficient time to allow for several viewings of the assigned material.*

Learning Technology Requirements
Brightspace (by D2L) is located on the University of Calgary server and will be used extensively for communication with students. **It is the student's responsibility to ensure that they receive all posted communications and documents and that they receive emails sent by instructors or fellow students through D2L.**

Only your @ucalgary.ca email address may be linked to D2L. Please ensure that you are regularly checking your @ucalgary.ca account.

A laptop, desktop, tablet or mobile device is required for D2L access. If you need help accessing or using D2L, please visit the Desire2Learn resource page for students: http://elearn.ucalgary.ca/d2l-student/.

Evaluation
The University policy on grading and related matters is described in section F of the 2023-2024 Calendar.

In determining the overall grade in the course, the following weights will be used:

Description	Percentage of Grade	Due Date
Mid-Term Examination I	20%	February 14 9:00-10:20 MT This exam will be delivered in person during class time. The exam will be handwritten. A scientific calculator is required, graphic calculators may not be used.
Mid-Term Examination II	20%	March 25 9:00-10:20 MT This exam will be delivered in person during class time. The exam will be handwritten. A scientific calculator is required, graphic calculators may not be used.
Journal Club Facilitation	5%	During the research design portion of the semester each student will be assigned a journal article to present in small groups. The student will be required to lead a discussion of the article with their peers during an assigned lab session using a discussion guide. After the session the student is responsible for summarizing the discussion including article strengths and weaknesses for grading. Facilitation date will vary depending on study design assigned. The completed discussion guide is due 3 days after the assigned facilitation date. Detailed instructions and a marking guide can be found on D2L.
Lab Assignments	15%	There will be 3 equally weighted Assignments. Assignment due dates and times are indicated in course schedule. Submitted online via D2L Dropbox.

In-Class Quizzes	10%	Every lecture will begin with a quiz covering the material from the previous lecture (please see course schedule below). The quiz will be administered via D2L. The quiz will open at 9:00am. Once the D2L quiz is opened, students will have only 10 minutes and one attempt to complete the quiz. Quizzes are open book and students may work collaboratively with their peers on the quiz. **Scheduled lecture materials will begin promptly at 9:10am so it is imperative students are on time to begin their quiz at 9:00. The ability to access the quiz will remain open until 9:30 in the event a student is late or away from class, but we will not delay beginning lecture materials to accommodate late students.**
Final Project (Contains several graded components due throughout the term. See Final Project Outline on D2L for details and marking rubrics)	30%	Projects will be delivered live on April 8 9:00 – 10:20 MT

**There is no Registrar-scheduled final exam for this course
**A student's final grade for the course is the sum of the separate assignments. It is not necessary to pass each assignment separately in order to pass the course.

- o Detailed instructions on assignment completion and format are available on D2L.
- o Detailed instructions on exam administration and format are available on D2L
- o The final project is broken down into several smaller components due during the course of the term. On D2L detailed instructions on each final project component, including marking rubrics, can be found

A Note regarding Writing Assignments:

Writing skills are important to academic study in all disciplines. In keeping with the University of Calgary's emphasis on the importance of academic writing in student assignments (section E.2 of 2023-24 Calendar), writing is emphasized, and the grading thereof in determining a student's mark in this course. The Bachelor of Health Sciences values excellence in writing. Competence in writing entails skills in crafting logical, clear, coherent, non-redundant sentences, paragraphs and broader arguments, as well as skills with the mechanics of writing (grammar, spelling, punctuation). Sources used in research papers must be properly documented. The University of Calgary offers instructional services through the Students' Success Centre's Writing Support Services (http://www.ucalgary.ca/writingsupport/) for students seeking feedback on assignments or seeking to improve their general writing skills. Students are **strongly encouraged** to take advantage of these programs.

Grading Scheme:

Letter Grade	Description	Percentage
A+	Outstanding performance	96-100
A	Excellent performance	90-95.99
A-	Approaching excellent performance	85-89
B+	Exceeding good performance	80-84
B	Good performance	75-79
B-	Approaching good performance	70-74
C+	Exceeding satisfactory performance	65-69
C	Satisfactory performance	60-64
C-	Approaching satisfactory performance	57-59
D+	Marginal pass	54-56
D	Minimal pass	50-53
F	Does not meet course requirements	0-49

Missed Components of Term Work:
*Students will lose 5% per day late past the deadline for all assignments. In this case, assignments will **NOT** be accepted more than 72 hours after the posted deadline and students failing to submit any assignment within this time frame will receive a mark of zero.*

As per University Calendar Section G.1.2, **students who are absent from an in-class assessment will receive a mark of zero on the missed component.** Students who are absent are responsible for contacting their instructor to discuss the impact of their missed assessment. The instructor may ask for supporting documentation to confirm an absence. Alternative opportunities for completing missed assessments or shifting of the assessment weight **may** be possible but are not guaranteed. Students who are identified as falsifying information related to missed assessments will be subject to investigation for academic misconduct.

*Extensions will **NOT** be granted on any assignment or quizzes in MDSC 407. The only exceptions to this are those in keeping with the University Calendar (debilitating illness, religious conviction, or severe domestic affliction) that are received in writing and with supporting documentation. Traffic jams and late or full buses are common events in Calgary and are NOT acceptable reasons for late arrivals to class, meetings and examinations. Please note that while absences are permitted for religious reasons, students are responsible for providing advance notice and adhering to other guidelines on this matter, as outlined in the University Calendar (https://www.ucalgary.ca/pubs/calendar/current/e-4.html).*

Course Evaluations and Student Feedback
Student feedback will be sought at the end of the course through the UCalgary Course Experience Survey and a qualitative student evaluation. Students are welcome to discuss the process and content of the course at any time with the instructor. Students may also address any concerns they may have with Dr. Fabiola Aparicio-Ting, Associate Dean (Undergraduate Health and Science Education) in the Cumming School of Medicine (feaparic@ucalgary.ca).

Attendance
Students are encouraged to attend all in-person sessions and to watch all pre-lecture videos. It should be noted that while attendance is not formally taken nor graded, students absent from in-person sessions or choosing not to watch pre-lecture videos will be at a disadvantage in terms of learning important materials.

Conduct During Lectures
The classroom should be respected as a safe place to share ideas without judgement - a community in which we can all learn from one another. Students are expected to frame their comments and questions to lecturers in respectful and appropriate language, always maintaining sensitivity towards the topic. Students, employees, and academic staff are also expected to demonstrate behaviour in class that promotes and maintains a positive and productive learning environment.

As members of the University community, students, employees and academic staff are expected to demonstrate conduct that is consistent with the University of Calgary Calendar, the Code of Conduct and Non-Academic Misconduct policy and procedures, which can be found at https://www.ucalgary.ca/student-services/student-conduct/policy .

Students are expected to take notes during class and should not rely solely on material supplied by the instructors. Instructors may or may not post lectures notes to D2L, at their individual discretion. Instructors may cover concepts or examples in class that may not be posted to D2L but may be assessed.

Use of Internet and Electronic Communication Devices in Class
The Bachelor of Health Sciences program aims to create a supportive and respectful learning environment for all students. The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. However, research studies have found that inappropriate/off-topic use of electronic devices in the classroom negatively affects the learning of others during class time.

Students are responsible for being aware of the University's Internet and email use policy, which can be found at https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Acceptable-Use-of-Electronic-Resources-and-Information-Policy.pdf.

Use of Artificial Intelligence Tools
Generative Artificial Intelligence (AI), and specifically foundational models that can create writing, computer code, and /or images using minimal human prompting includes not only GPT-4 (and its siblings ChatGPT and Bing), but many writing assistants that are built on this or similar AI technologies.

Students may use artificial intelligence tools, including generative AI, in **MDSC 407** as learning aids or to help produce assignments. However, **students are ultimately accountable for the work they submit.** Students may choose to use generative artificial intelligence tools as they work through the assignments in this course; this use must be documented in an appendix for each assignment. The documentation should include what tool(s) were used, how they were used, and how the results from the AI were incorporated into the submitted work. Failure to cite the use of AI generated content in an assignment/assessment will be considered a breach of academic integrity and subject to Academic Misconduct procedures.

UNIVERSITY OF CALGARY POLICIES AND SUPPORTS

Copyright
All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (https://www.ucalgary.ca/legal-services/university-policies-procedures/acceptable-use-material-protected-copyright-policy) and requirements of the Copyright Act

(https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html) to ensure they are aware of the consequences of unauthorized sharing of course materials (including instructor notes, electronic versions of textbooks, etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy https://www.ucalgary.ca/pubs/calendar/current/k.html.

Instructor Intellectual Property
Course materials created by instructors (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. These materials may **NOT** be reproduced, redistributed or copied without the explicit consent of the professor. **The posting of course materials to third party websites such as note-sharing sites without permission is prohibited**. Sharing of extracts of these course materials with other students enrolled in the course *at the same time* may be allowed under fair dealing.

Academic Accommodations
It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The Student Accommodations policy is available at https://ucalgary.ca/student-services/access/prospective-students/academic-accommodations. Students needing an accommodation based on disability or medical concerns should contact Student Accessibility Services (SAS) in accordance with the Procedure for Accommodations for Students with Disabilities (https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf). SAS will process the request and issue letters of accommodations to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/ .

Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to Dr. Fabiola Aparicio-Ting (feaparic@ucalgary.ca), Associate Dean, Undergraduate Health and Science Education.

Academic Misconduct
The University of Calgary is committed to the highest standards of academic integrity and honesty. The University of Calgary has created rules to govern all its members regarding the creation of knowledge and the demonstration of knowledge having been learned.

Academic Misconduct refers to student behaviour that compromises proper assessment of a student's academic activities and includes (but is not limited to): cheating, fabrication, falsification, plagiarism, unauthorized assistance, failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses, and failure to comply with exam regulations applied by the Registrar. **It also includes using of third party websites/services to access past/current course material, essay/assignment writing services, or real-time assistance in completing assessments, seeking answers to assessment questions and similar, whether paid, bartered or unpaid.**

For information of the Student Academic Misconduct Policy and Procedures, please visit; https://www.ucalgary.ca/legal-services/university-policies-procedures/student-academic-misconduct-policy.

Additional information is available on the Academic Integrity website at: https://ucalgary.ca/student-services/student-success/learning/academic-integrity.

Recording of Lectures
Audio or video recording of lectures (or similar) is prohibited except where explicit permission has been received from the instructor.

Freedom of Information and Protection of Privacy Act
Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary

Appeals
If there is a concern with the course, academic matter or a grade, first communicate with the instructor. If these concerns cannot be resolved, students can proceed with an academic appeal, as per Section I of the University Calendar. Students must follow the official reappraisal/appeal process and may contact the Student Ombuds' Office (http://www.ucalgary.ca/student-services/ombuds) for assistance with this and with any other academic concerns, including academic and non-academic misconduct. Students should be aware that concerns about graded term work may only be initiated **within 10 business days** of first being notified of the grade. https://www.ucalgary.ca/pubs/calendar/current/i-2.html

Sexual and Gender-Based Violence Policy
The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary's sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Sexual-and-Gender-Based-Violence-Policy.pdf.

Resources for Support of Student Learning, Success, Safety and Wellness
Student Success Centre   http://www.ucalgary.ca/ssc/
Student Wellness Centre   http://www.ucalgary.ca/wellnesscentre/
Student Advocacy and Wellness Hub (CSM)
         https://cumming.ucalgary.ca/mdprogram/current-students/student-advising-wellness
Distress Centre   http://www.distresscentre.com/
Library Resources   http://library.ucalgary.ca

Wellness and Mental Health Resources
The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the UCalgary Wellness Centre (https://www.ucalgary.ca/wellness-services/services/mental-health-services) and the Campus Mental Health Strategy (http://www.ucalgary.ca/mentalhealth/).

Student Ombuds' Office
The Student Ombuds' Office supports and provides a safe, neutral space for students. For more information, please visit www.ucalgary.ca/student-services/ombuds/ or email ombuds@ucalgary.ca

BHSc Student Faculty Liaison Committee (SFLC)
The BHSc SFLC, with elected representatives from all majors, serves to raise issues of interest to BHSc students to the program administration, including items pertaining to curriculum, scheduling and events. A list of current representatives can be found on the BHSc website.

Student Union (SU) Information
The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; the SU representatives for the Cumming School of Medicine can be reached at medrep1@su.ucalgary.ca or medrep2@su.ucalgary.ca.

Student Success Centre
The Student Success Centre provides services and programs to ensure students can make the most of their time at the University of Calgary. Our advisors, learning support staff, and writing support staff assist students in enhancing their skills and achieving their academic goals. They provide tailored learning support and advising programs, as well as one-on-one services, free of charge to all undergraduate and graduate students. For more information visit: https://www.ucalgary.ca/student-services/student-success

Emergency Evacuation/Assembly Points
As part of the University of Calgary Emergency Evacuation plan, students, faculty, and staff should locate the closest Assembly Point in case of Fire Alarm. Safety signage is posted throughout the campus showing the locations and the possible route to these locations. All students, faculty, and staff are expected to promptly make their way to the nearest Assembly Point if the Fire Alarm is activated. No one is to return into campus facilities until an all clear is given to the warden in charge of the Assembly Area. For more information, see https://www.ucalgary.ca/emergencyplan/building-evacuation/assembly-points

Safewalk
Campus security will escort individuals, day or night, anywhere on campus (including McMahon Stadium, Health Sciences Centre, Student Family Housing, the Alberta Children's Hospital and the University LRT station). Call 403-220-5333 or visit http://www.ucalgary.ca/security/safewalk. Use any campus phone, emergency phone or the yellow phone located at most parking lot pay booths. Please ensure your personal safety by taking advantage of this service.

Class Schedule

The following is a list of topics for class and assignment / exam due dates. Please note that unforeseen circumstances may cause changes to the schedule with respect to the timing of topics. Students will be notified of all changes in a timely manner by way of email and D2L announcements. The exam dates are firm and will not be altered.

Date	Video Lectures (must be viewed prior to lecture date)	Instructor	In Class Quiz	Lab Topics	Assignment Due Dates (23:59 unless otherwise noted)
January 8	Course Overview Live lecture, no prep work required	Dr. Li, Dr. Holodinsky	-	Introduction to Stata	January 12 – Join Final Project Group on D2L*
January 10	Introduction to Statistics, types of data, populations, and samples	Dr. Holodinsky	-		
January 15	Descriptive Statistics: Summary Statistics and Graphics	Dr. Holodinsky	Introduction to Statistics Quiz	Generating descriptive statistics and graphics in Stata. Ecological Study Journal Club (facilitated by TA).	January 19 – Group Contract Due
January 17	Introduction to the Scientific Method and Research Design Ecological Study Design: individual vs ecological data, the ecological fallacy	Dr. Holodinsky	Summary Statistics and Graphics Quiz		
January 22	Measures of Occurrence: prevalence, incidence, rates, risks, and odds	Dr. Holodinsky	Scientific Method & Ecological Study Quiz	Review of measures of occurrence. Diagnostic Accuracy Study Journal Club *(Presenter discussion guide due Jan 29)*	January 26 – Project Dataset Due
January 24	Probability: Application of Probability in Diagnostics Diagnostic Accuracy Study Design	Dr. Holodinsky	Measures of Occurrence Quiz		

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Date	Video Lectures (must be viewed prior to lecture date)	Instructor	In Class Quiz	Lab Topics	Assignment Due Dates (23:59 unless otherwise noted)
January 29	Validity, reliability, precision, and bias The Cross-Sectional Study	Dr. Holodinsky	Diagnostic Accuracy Quiz	Observational Studies (Cross-Sectional, Case Control, Cohort) Journal Club *(Presenter discussion guide due Feb 5)*	February 2 – Lab Assignment 1 Due
January 31	Cohort and Case Control Studies	Dr. Holodinsky	Validity, reliability, precision, bias, & Cross-sectional study Quiz		
February 5	The Randomized Controlled Trial and Quasi-Experiments	Dr. Holodinsky	Cohort and Case Control Quiz	Experimental Studies (RCT & Quasi-Experiment) Journal Club *(Presenter discussion guide due Feb 12)*	
February 7	Hypothesis Testing: Principles of Hypothesis Testing	Dr. Holodinsky	RCT and Quasi Experiment Quiz		
February 12	MIDTERM 1 Preparation	Dr. Holodinsky	Principles of Hypothesis Testing Quiz	Final Project Consultation	February 16 – Project Proposal Abstract Due
February 14	MIDTERM (Up to and including Feb 5)				
February 19, 21	WINTER TERM BREAK				
February 26	Probability: Probability Distributions	Dr. Li	Review of Probability (Jan 24) Quiz	Review of probability distributions; Calculating Z and t-scores by hand and in Stata; Review of hypothesis testing theory	
February 28	The Central Limit Theorem	Dr. Li	Probability Distributions Quiz		
March 4	Interval Estimates: Confidence Intervals for Means and the t-distribution	Dr. Li	The Central Limit Theorem Quiz	Calculating confidence intervals by hand and in Stata;	Assignment 3 Due Mar 10 23:59

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Date	Video Lectures (must be viewed prior to lecture date)	Instructor	In Class Quiz	Lab Topics	Assignment Due Dates (23:59 unless otherwise noted)
March 6	Continuous Data: The One Sample t-test	Dr. Li	Confidence Intervals for Means and t-distribution Quiz	One sample t-test by hand and in Stata	
March 11	Continuous Data: The Paired t-test & Two Sample t-test	Dr. Li	The One Sample t-test Quiz	The paired and two sample t-tests by hand and in Stata; Power and Sample Size by hand and in Stata	
March 13	Power and Sample Size for t-test (One-sample, paired, and two-sample)	Dr. Li	The Paired t-test & Two Sample t-test Quiz		
March 18	Categorical Data: The Chi-square test, Fisher's Exact test, and Odds ratios	Dr. Li	Power and Sample Size for t-test Quiz	The Chi-square test, Fisher's Exact test, and Odds ratios in Stata; Midterm 2 Preparation	Final Project Analysis Plan Due Mar 20 23:59
March 20	MIDTERM 2 Preparation	Dr. Li	-		
March 25	MIDTERM 2 (up to and including March 18)				
March 27	Categorical Data: The two-sample test of proportions Power and Sample Size for tests for Proportions	Dr. Li	The Chi-square test, Fisher's Exact test, and Odds ratios Quiz	The two-sample test of proportions, power and sample size for proportions in Stata	Assignment 4 Due Apr 2 23:59
April 1	EASTER MONDAY – NO CLASSES			ANOVA calculations by hand and in Stata; Linear regression hypothesis testing in Stata	
April 3	Hypothesis Testing for More than Two Groups: The ANOVA Linear Regression	Dr. Li	The Two-Sample Test, Power and Sample size for Proportions Quiz		
April 8	Final Projects			No Labs	Final Project Materials Due April 7 at 12:00

*Students enrolling late in the course will be added to a group by the instructors