

COURSE DESCRIPTION

Advances in hardware and software technologies have led to a rapid increase in the amount of data collected, with no end in sight. Decision making in the coming decades will depend, to an even greater extent, on extracting meaning and knowledge from all that data. In this class we focus on one branch of statistics, inferential statistics, to help us reason about data. By gathering datasets, formulating proper statistical analyses and executing these analyses, information professionals play a significant role in bridging the gap between raw data and decision making.

This course will introduce basic concepts in data analytics including study design, measure construction, data exploration, hypothesis testing, and statistical analysis. The course also provides an overview of commonly used data manipulation and analytic tools. Through homework assignments, projects, and in-class activities, you will practice working with these techniques and develop statistical reasoning skills.

LEARNING OBJECTIVES

After completing this course, you will be able to:

- Select and evaluate various types of data to use in decision making;
- Use prescriptive and descriptive analyses to reach defensible, data-driven conclusions;
- Select and apply appropriate statistical methods;
- Use R and MS Excel for basic data manipulation and analysis;
- Critically evaluate data analyses and develop strategies for making better decisions.

INST314 - Statistics for Information Science

Section ESG1
Fall 2019

Class Meets:

Tuesdays and Thursdays
9:45– 11:00 am
II - 3052

Instructor:

Prof. Lori Perine
lperine@umd.edu

Office: I - 207

Office Hours:

Tuesdays and Thursdays
11:00 – 11:30 a.m. and by
appointment.

Virtual Office:

<https://umd.webex.com/meet/lperine>

Teaching Assistant:

Mr. Will Thomas
wthomas4@umd.edu
202 476 9040

Office: Virtual TBD

Office Hours:

Thursday 11a.m. – 12 p.m.

COURSE COMMUNICATIONS

The best way to reach me is **via email** at lperine@umd.edu. **Do not use ELMS email.** Begin the subject line with “INST314-ESG1 (YOURLASTNAME)”, followed by a concise topic of you email. EMAILS THAT ARE NOT PROPERLY LABELED RISK BEING OVERLOOKED OR IGNORED. Expect a response within 24 hours on weekdays, and by the next business day if sent on a Friday evening or weekend. Please use the same protocol when contacting Mr. Thomas, our course Teaching Assistant.

Please use the course **Discussion Boards (DB)** on ELMS to address all questions about assignments, lectures, how to use R and Excel, and similar topics. **DO NOT email questions that can be answered on the DB.** Posting to the DB allows 1) a common location to answer questions that many of you might have, and 2) provides an opportunity for your classmates to respond and assist in both of your learning.

Before you post, check the DB to see if someone else has already asked your question. The instructional team regularly monitors the DB to respond in a timely manner—ideally within a couple of hours during the day and early evening.

I will use ELMS Announcements to communicate general information to the class. Please be sure that your ELMS notifications are set to receive course announcements via email.

COURSE MATERIALS AND RESOURCES

1. Technology

The following technologies are REQUIRED. They are necessary for you to successfully complete the homework, labs, exams, and projects for this course.

- We will have in-class data explorations and lab sections during which you will need a **laptop computer**. If you do not have a laptop, please contact me after the first class.
- You must install and use R. **R programming language and software** is free and available online (<https://www.r-project.org/>). **R Studio** is also highly recommended; R studio is an integrated development environment for R (<http://web.cs.ucla.edu/~gulzar/rstudio/>). I will use R Studio almost exclusively for in-class demonstrations. Links to R tutorial videos are posted on ELMS.
- You must have access to **Microsoft Excel**. Excel is available for PC and Macintosh through the university's TERPware website (<https://terpware.umd.edu>).

2. Readings:

Completing the required reading for the class is essential to understanding the core statistical concepts. In order to learn, *you must review the material multiple times*. There will be required readings each week from one or more of the three main textbooks listed below. The resources are available free of charge. The course schedule on ELMS will be updated weekly with readings (and other assignments). In any given week, there may be readings in additional advanced topics, beyond the course textbook, which will be posted on ELMS.

Required:

- Diez, D., Barr, C., and Çetinkaya-Rundel, M. (2015), *OpenIntro Statistics*, 4th ed., OpenIntro. <https://www.openintro.org/stat/textbook.php>
 - Available as a free pdf download, color hardcover of black & white paperback for purchase, and free interactive website.
- Online Statistics Education: A Multimedia Course of Study (<http://onlinestatbook.com/>). Project Leader: David M. Lane, Rice University.
 - This is a free, online stats book available via HTML, pdf, and e-pub.
- Verzani, J. (2004), *Using R for Introductory Statistics*, Chapman & Hall/CRC. ISBN/ASIN: 1584884509 ISBN-13: 9781584884507 <https://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf>

Optional:

For many different reasons, not everyone likes the required textbook in a quantitative methods course. Alternatively, some of you may wish to further explore some of the course topics and how to use statistical software. The following books have been recommended or are used by my colleagues, and they address many of the same course topics from varied writing approaches. I will not provide copies of these books, but all of them should be available through a wide range of bookstores.

Recommended:

- Radziwill, N.M. (2017), *Statistics (The Easier Way) With R*, 2nd ed., Lapis Lucera. ISBN-13: 978-0- 9969160-5-9.
 - *This was one of the textbooks used at the iSchool in recent terms. It is highly recommended for statistics using R. The author offers a free e-book version with proof of purchase of the physical book copy.*
- Imai, K. (2017), *Quantitative Social Science: An Introduction*, Princeton Press. ISBN- 13: 9780691175461
- Salkind, N.J. (2013), *Statistics for People Who (Think They) Hate Statistics*, 5th ed., Sage Publications, Inc. ISBN-13: 978-1452277714
- Hinton, P. (2004) *Statistics Explained: A Guide for Social Science Students*, 2nd ed., Routledge. ISBN-13: 978-0415332859
- Kremelberg, D. (2011) *Practical Statistics: A Quick and Easy Guide to IBM SPSS, Stata, and Other Statistical Software*, Sage Publications, Inc. ISBN-13: 978-1412974943

Additionally, if you want to learn more about using R for data science, the following book is highly recommend:

- Wickham, H. and Golemund, G. (2017) *R for Data Science*, O'Reilly Media. ISBN-13: 978-1491910399. <http://r4ds.had.co.nz/index.html>
 - This is a free book available in HTML and a physical copy is available for purchase

3. Websites

- **ELMS-Canvas:** <http://elms.umd.edu>. All relevant, required course content will be stored or linked from ELMS.
- **DataCamp:** <http://www.datacamp.com>
DataCamp is a third-party skills training company and website. The subscription costs to access DataCamp materials is free for students while part of INST 314. I will send you an invitation to join our DataCamp classroom to complete various assignments. Some assignments are required, others will provide extra credit.

COURSE ACTIVITIES

1. Lab Assignments

There will be 10 – 12 weekly lab assignments that are designed to apply your understanding of statistical concepts and provide you with hands-on experience with using R within the context of the topics being taught in class. Often, these assignments will be started in class and then will need to be completed as homework. Although group work and collaboration is encouraged, each student must submit her/his/their own work to earn.

Completed labs will be submitted via ELMS no later than 11:59 pm on the scheduled due date. Since labs are submitted online via ELMS, due dates will not be affected by campus closures or changes in the classroom schedule. Late submissions will be subject to a 50% penalty. Lab keys will be posted within 48 hours of the due date, so that they can be used to study for quizzes. **Therefore, submissions more than 48 hours after the due date will not be accepted and you will receive a zero for that lab assignment.** Grades/feedback on your lab submission will be posted within one week of the due date.

Labs will count as a substantial part of your grade and are very important for preparing for quizzes and exams. Course quizzes will be based on the labs and the readings, so **it is important that you develop an independent understanding and competency with the concepts and applications we are studying, even if you do your work in a group.** Please take advantage of the Discussion Boards and office hours to ensure that your individual understanding is solid.

2. Quizzes

Approximately every two weeks, there will be a quiz that is designed to test your knowledge from the previous week and provide you rapid feedback to improve your understanding of the material. Quizzes will be taken on ELMS in the first 10 -15 minutes of class. The best way to do well on the quizzes is to do the reading and lab assignments. There will be a total of 6 quizzes; your lowest quiz score will be dropped. **THERE WILL BE NO MAKEUP QUIZZES.** Quiz dates are indicated on the Course Schedule. If you miss a quiz, it will count as the dropped grade. Quiz results will be available typically by the next class period, but definitely within one week.

3. Projects (Case Studies)

There will be a total of four (4) projects. These are your opportunity to apply concepts learned in class to real problems and data sets. These assignments will be 2 page “decision memo” reports with statistical analysis. Some of the assignments will be collaborative (groups) and others will be individual. The fourth project is one of the individual assignments and will be counted as a “Final Class Project”. It will be graded with greater scrutiny than previous projects. **Projects will be submitted via ELMS no later than 11:59 pm on the due date.** Since projects are submitted online via ELMS, they will be unaffected by campus closures or changes in the classroom schedule. Project grades/feedback typically will be provided within 10 days of the submission date, but definitely within two weeks.

4. Exams

There will be two midterms and a cumulative final. These exams provide an opportunity for you to test your understanding of the concepts, techniques, and problems associated with statistical reasoning. In order to learn and understand the material fully it is important to review and revisit it multiple times. If the grade on your final exam is higher than your lowest midterm grade, I will use the final exam grade in place of the midterm grade when calculating your final course grade. Project grades/feedback typically will be provided within 10 days of the exam date, but definitely within two weeks.

A MAKEUP EXAM CAN ONLY BE ARRANGED PRIOR to the scheduled exam date.

You must give at least 48 hours notice of the need to make alternate arrangements with me, in accordance with the terms of the excused absence policy below. If you miss a midterm exam, you must contact me immediately with documentation of an excused absence. In that case, your final exam grade will count as the makeup for that exam. Otherwise, you will receive a zero (0) for that exam. Please note that makeup work is not given priority in grading and will be returned subject to the schedules of the instruction team.

GRADES

Your grade is determined by your performance on course activities according to the weightings below. All graded activity will be posted on ELMS. Please note that Canvas does not always calculate grades properly. ‘Final’ grades posted in ELMS may vary substantially before the end of the term. If you are concerned about any part of your grade, please come see me.

Activity	Weight
Lab Assignments	25%
Projects 1 -3	15%
Final Project 4	10%
Quizzes	10%
Midterm Exams 1 & 2	25%
Cumulative Final	15%

If you have questions about anything graded, please check with me for clarification. If you believe the work was not graded correctly, please see the re-grading policy below. See below for the grade policy on late work submissions.

Your course grade will be assigned based on the total percent earned, using the following rubric. Grades will be rounded to the nearest 10th of a percent. Please come and talk to me early if you think that there might be a problem. No extra credit will be given at the end of the semester.

A-	90.0-92.9%	A	93.0-100%	B+	87.0-89.9%
B-	80.0-82.9%	B	83.0-86.9%	C+	77.0-79.9%
C-	70.0-72.9%	C	73.0-76.9%	D+	67.0-69.9%
D-	60.0-62.9%	D	63.0-66.9%		

F 0-59.9%

COURSE POLICIES

Attendance

Attending class is not mandatory; however, your attendance in class is expected and is likely to influence your class performance and grade. Class sessions will include information gleaned from discussions and hands-on activities, which are not included in written materials on ELMS. If you miss class, it is **YOUR RESPONSIBILITY** to obtain any handouts or materials provided by the instructor and to get copies of notes by classmates covering what you missed. I will be happy to tell you which topics were covered and direct you to materials that you can use to learn what you missed. However, neither I nor any other member of the instructional team will repeat lectures or activities that were missed in class.

Excused Absences

This class is conducted consistent with the University of Maryland excused absence policy, which you will find posted on ELMS along with this syllabus.

If you are absent for any reason, please notify me. An absence without notification will be considered unexcused. Excused absences require proper notification and documentation, per University policy. If you miss class on an exam day or any other non-regular class day on the schedule, you will need documentation to excuse your absence. Any work from an excused absence must be made up within one (1) week of the original deadline, but no later than the scheduled date of the final exam. Any work or assessment missed due to an unexcused absence will be given a score of zero (0). **Missed exams without a documented, excused absence cannot be made up and will receive a score of zero (0).**

If a student is delayed or absent more than TWO times consecutively, the instructor will require documentation signed by a health care professional. If you have a prolonged sickness/injury or other event that affects your ability to complete assignments, you **MUST** obtain a signed note from a doctor or similar qualified representative **AND** that note **MUST** identify: 1) if you are well enough to attend class or not, 2) if you are well enough to complete assignments in or out of class.

Late Work

Timely submission of the completed assignments is essential. The due date of each assignment will be stated clearly in the assignment description. Late lab assignments will be subject to a 50% penalty, as noted above, and no submissions will be accepted 48 hours after the due date. Late projects will be subject to the following penalty:

Late Penalty Schedule

Up to 1 day	1 ≤ 2 days	2 ≤ 3 days	3 ≤ 4 days	4 ≤ 5 days	5 ≤ 6 days	> 6 days
10%	15%	20%	25%	30%	40%	50%

In all cases, work that is submitted late will NOT receive priority in grading and thus most likely will not be returned within the turnaround times noted above. Late work will be graded and returned by the instructional team as scheduling permits.

Re-grading

Fairness in giving grades is very important to me, at the same time both our time is best spent on helping you learn the material. Re-grading of assignments and exams must be turned in within one week of receiving the graded work. They must be submitted as a written document in which you include the graded work, an explanation of what you believe was miss-graded, and an explanation for why you think it should be given a different score. For any re-grade requests, the entire assignment will be regarded and your score may go up or down. Please note: All makeup exams and work are EXEMPT from the re-grading policy. Also, you may make no more than two (2) re-grading requests during this course.

Other Policies

Other policies relevant to undergraduate courses are found here: <http://ugst.umd.edu/courserelatedpolicies.html>. Topics that are addressed in these various policies include academic integrity, student and instructor conduct, accessibility and accommodations, attendance and excused absences, grades and appeals, copyright and intellectual property.

Electronic Devices

Students are requested to place cell phones and other electronic devices on vibrate and to refrain from their use within the classroom. If you have a critical communication to attend to, please excuse yourself from the classroom and return when the communication has been completed.

Except when required for DSS accommodations or during interactive activities, laptops or tablets should remain closed during lectures. Unfortunately, our digital devices present irresistible distractions and detract from the cooperative learning environment. In addition, research shows that we learn and retain information with better comprehension when notes are taken by hand. Please be sure to bring a notebook or other note taking materials to each class.

Syllabus Change Policy

This syllabus is a guide for the course and is subject to change with advance notice. Notice will be given verbally in class and posted via ELMS announcements.

OFFICE HOURS

Please visit during office hours or make an appointment to see me at a time when it is mutually convenient. I am usually available on Thursdays for longer than the posted hours, and can also make appointments before class or on other days of the week. This is an opportunity to ask questions about the material covered in the reading materials or in lecture. If you are having trouble in the course please talk to me as soon as possible. If you do poorly or lower than you expected on

the first exam, it is imperative that you come to office hours so that we can figure out the problem early.

ACADEMIC DISHONESTY

Cheating in any form (copying, falsifying signatures, plagiarism, etc.) will not be tolerated. It will result in a referral to the Office of Student Conduct irrespective of scope and circumstances, as required by university rules and regulations. There are severe consequences of academic misconduct, some of which are permanent and reflected on the student's transcript. If you have any questions regarding the University's policies on scholastic dishonesty, please see <http://osc.umd.edu/OSC/Default.aspx>.

It is very important that you complete your own assignments, and do not share files (excluding raw data), partial work or final work.

University of Maryland Code of Academic Integrity

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://shc.umd.edu/SHC/Default.aspx>.

ACCOMMODATIONS

Please come and see me as soon as possible if you think you might need any special accommodations for disabilities. In addition, please contact the Disability Support Services (301-314-7682 or <http://www.counseling.umd.edu/DSS/>). Disability Support Services will work with us to help create appropriate academic accommodations for any qualified students with disabilities. If you experience psychological distress during the course of the semester you can get professional help at the Counseling Center (301-314-7651 or <http://www.counseling.umd.edu/>).

Get Some Help!

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit tutoring.umd.edu to learn more about the wide range of campus resources available to you. In particular, everyone can use some help to sharpen their communication skills (and improving their grade) by visiting ter.ps/writing and scheduling an appointment with the campus Writing Center. You should also know there are a wide range of resources to support you with whatever you might need (see go.umd.edu/assistance), and if you just need someone to talk to, visit counseling.umd.edu or [one of the many other resources on campus](#).

Most services are free because you have already paid for it, and **everyone needs help...** all you have to do is ask for it.

Basic Needs Security

If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live and believe this may affect your performance in this course, please visit go.umd.edu/basic-needs for information about resources the campus offers to you and let me know if I can help in any way.

Names/Pronouns and Self Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more.

Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

Emergency Preparedness

Please check the USG's notification services for closures during inclement weather and other emergency situations. Please be aware that the USG campus does not necessarily follow closures announced for the College Park campus.

Classroom Environment

Our classroom environment should be professional and mutually respectful. Discussions should be based on course readings and assignments. Remember—others may have different perspectives on issues than you, but they still deserve your respect.

TENTATIVE COURSE SCHEDULE

This schedule is for planning purposes and may change. See Elms/Canvas for current information and deadlines.

Week	Day	Topics	Readings	Assignments/Assessments (Homework, Project, Labs)
1	8/27	Syllabus, Course Intro, Case Study		Who You Are (due by Wed midnight)
	8/29	Six-Step Method for Statistical Investigations Fundamentals of R Data Basics	Diez et al. (OpenIntro) 1.1-1.3 Open Statistics Education (OSE) pp. 11-14	Start Lab 1
2	9/3	Sampling Research Design	OpenIntro 1.4 OSE pp. 231-244	
	9/5	Exploring and Summarizing Data	OpenIntro Ch. 2, OSE Ch. 2	Quiz 1 Lab 1 due Wed @ 11:59 p.m. Start Lab 2
3	9/10	Exploring and Summarizing Data (cont.)	OpenIntro Ch. 2, OSE Ch. 2 (cont)	
	9/12	Foundations for Inference: Statistics	See ELMS	Lab 2 due Wed @ 11:59 p.m. Start Lab 3 Project 1 Assigned
4	9/17	Foundations for Inference: Simulation	See ELMS	Quiz 2
	9/19	Foundations for Inference: Strength	See ELMS	Lab 3 due Wed @ 11:59 p.m. Start Lab 4



5	9/24	Univariate Inference (I)		Project 1 Due
	9/26	Univariate Inference (II)		Lab 4 due Wed @ 11:59 p.m. Start Lab 5
6	10/1	Bivariate Inference (I)		Quiz 3
	10/3	Bivariate Inference (II)		Lab 5 due Wed @ 11:59 p.m. Start Lab 6 Project 2 Assigned
7	10/8	Power		
	10/10	Understanding Chi-Square		Quiz 4 Lab 6 due Wed @ 11:59 p.m.
8	10/15	Chi Square Test of Independence		Project 2 Due
	10/17	Midterm I Review/Catchup		
9	10/22	Midterm I		
	10/24	One-way ANOVA		Start Lab 7

10	10/29	One-way ANOVA		
	10/31	Factorial ANOVA		Project 3 Assigned Lab 7 due Wed @ 11:59 p.m. Start Lab 8
11	11/5	Scatterplots and Correlations		Quiz 5

	11/7	Linear Regression		Lab 8 due Wed @ 11:59 p.m. Start Lab 9
12	11/12	Linear Regression		Project 3 Due
	11/14	Multiple Regression		Lab 9 due Wed @ 11:59 p.m. Start Lab 10 Project 4 Assigned
13	11/19	Multiple Regression		Quiz 6
	11/21	Midterm Review/Catchup		Lab 10 due Wed @ 11:59 p.m.
14	11/26	Midterm II		
	11/28	THANKSGIVING		
15	12/3	Intro to Advanced Methods		
	12/5	Final Project Peer Review		

Final Project Due: Tuesday December 10

Final Exam: Thursday December 12

Key Dates: Fall 2019

First Day of Classes	August 26 (Monday)
Labor Day	September 2 (Monday)
Thanksgiving Recess	November 27- December 1 (Wednesday-Sunday)
Last Day of Classes	December 9 (Monday)
Reading Day	December 10 (Tuesday)
Final Exams	December 11-17 (Wednesday-Tuesday)
Commencement - Main Ceremony ¹	December 17 (Tuesday)
Commencement - College/Department Ceremonies ¹	December 18 (Wednesday)

