Data/Math 363 Introduction to Statistical Methods – Section 01
Spring 2021 – Live Online
Tuesday and Thursday from 9:30AM to 10:45AM (MST)

Description of Course:
Data/Math 363 is an applications-oriented calculus-based statistics course with an introduction to statistical software that serves as the foundation course for the Statistics and Data Science undergraduate major and minor.

Course Prerequisites:
Math 223 and have completed Math 310 or 313 or 215, or are registered for Math 310 or 313.

Instructor: Dr. Christina Durón
Office: Online via D2L
E-mail: duronc@math.arizona.edu
Website: https://cduron.info
Office Phone: 520-621-6870
Tutoring: http://math.arizona.edu/~tutoring
Official Course Communication: duronc@math.arizona.edu

Official course website:
https://d2l.arizona.edu/d2l/home/1002155
Course Location: Live Online via Zoom on D2L
Office Hours (MST): Held Online via Zoom on D2L
Tuesday 1PM – 2PM
Wednesday (Upper Division) 1PM – 2PM
Thursday 1PM – 2PM
Or by appointment

Graduate Teaching Assistant: Shenghao Xia
Email: shenghaoxia@email.arizona.edu
Office Hours (MST): Monday 2PM – 3:30PM
Wednesday 2PM – 3:30PM

Undergraduate Teaching Assistant: Zijie "Ronnie" Chu
Email: zijiechu@email.arizona.edu
Office Hours (MST): Friday 9AM – 10AM

Makeup Policy for Students Who Register Late:
Students who register after the first course meeting may make up missed assignments/quizzes within two weeks upon successful registration. Additional time will be granted based upon the approval of the instructor.

Course Format and Teaching Methods:
This class is scheduled to be taught in the Live Online modality, meaning that the instructor and students are online simultaneously, and the instructor provides content in a live online platform.

Class Meetings:
This class will meet live online on Tuesdays and Thursdays at 9:30AM – 10:45AM (MST) via Zoom. The Zoom link for each meeting may be accessed through the Calendar on the D2L course page. Our synchronous meetings will give us the opportunity to develop our understanding of the content material and work to meet the course goals and objectives using a variety of instructional techniques. On any given day, this may include lecture, discussion, and group work. All lecture and R coding materials will be posted to the D2L course page before/after each class meeting.

Class Attendance:
Although regular attendance is not required, you are expected to keep up with any and all missed material.

- If you feel sick, or may have been in contact with someone who is infectious, stay home. Except for seeking medical care, avoid contact with others and do not travel.
- Notify your instructor if you will be missing an in person or online course.
- Campus Health is testing for COVID-19. Please call (520) 621-9202 before you visit in person.
- Visit the UArizona COVID-19 page for regular updates.
- Students who need to miss more than one week of classes in any one semester must provide a doctor's note of explanation to DOS-deanofstudents@email.arizona.edu.

Staying Current:
You are required to complete each missed homework, online quiz, and discussion board post, and watch each lecture recording on your own time to develop a level of competence with the course objectives. In addition, you are required to complete and submit each homework and quiz to Gradescope by the due date listed on the Calendar on the D2L course page.

Class Recordings:
For lecture recordings, which are used at the discretion of the instructor, students must access content in the D2L course page. Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings or using them in a manner inconsistent with UArizona values and educational policies are subject to suspension or civil action.

Course Communications:
It is the student's responsibility to keep informed of any announcements, syllabus adjustments or policy changes made during scheduled classes, by email, or through D2L. Course-wide announcements will be distributed using D2L. To reach the instructor directly, it is preferred that emails are sent to the address duronc@math.arizona.edu and not sent through D2L.

Course Goals and Objectives:
Data/Math 363 will be using your background in the natural or social sciences, the humanities, or engineering and your previous knowledge of algebra, calculus and linear algebra to consider the issues of collection, model derivation and analysis, interpretation, explanation, and presentation of data. The objective of this course is to take advantage of the coherent body of knowledge provided by statistical theory having an eye consistently on the application of the subject. This approach will allow you to extend your ability to use methods in data science beyond those given in the course.

Course Topics:
The topics covered in this course include:

- organizing data numerically and visually
- axioms of probability, conditional probability and independence
- random variables and expectation with emphasis on parametric families
- Law of Large Numbers and Central Limit Theorem
- estimation, bias and variance, confidence intervals
- hypothesis testing, significance and power
- likelihood ratio tests such as proportion tests, t-tests, chi-square tests, and analysis of variance

Expected Learning Outcomes:
Upon completion of the course, the student will be capable of:

- understanding what statistical thinking is
- integrating statistical thinking with scientific procedures and quantitative modeling
- asking statistics experts productive questions
- implementing their ideas using statistical software and other computational tools

Course Materials:
The course materials include:

- *An Introduction to the Science of Statistics: From Theory to Implementation* by Joseph C. Watkins (the PDF of the textbook is provided for free, click here)
- R or RStudio (software environment for statistical computing and graphics, also free)
- A graphing calculator, although any model in Ti-83 or Ti-83 series is recommended

Equipment and Software Requirements:
For this class you will need daily access to a device with webcam and microphone and reliable internet signal that can:

- Access D2L and Gradescope
- Join Zoom meetings
- Watch lecture recordings posted on D2L
- Scan and upload written work

- Perform statistical calculations through R or RStudio
- View PDF documents
- View PowerPoints documents

Note: Enrolled students can borrow technology from the UA Library on a first come, first served basis. See https://new.library.arizona.edu/tech/borrow for details.

Classroom Behavior Policy:
To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed.

To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.). Students are asked to refrain from disruptive conversations with people during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Netiquette:
Netiquette is an abbreviation for "internet etiquette" – more simply put, guidelines for communicating online to ensure meaningful and polite exchanges. The common standards listed below work well for both the online classroom and beyond in professional online communication:

- **Behavior**: Maintain the same standard of behavior and ethics that you would follow in a face-to-face
- **Tone**: Treat others with respect. Be mindful of your tone and how that is conveyed in your writing style. DO NOT USE ALL CAPS. It is considered shouting and not appropriate in a classroom. Avoid sarcasm and irony as it is easily misinterpreted in an online environment.
- **Clarity and Content**: Be succinct. Write, reread, and then post. Carefully consider what you have written. Does it make sense? Is it free from errors? Does it add to the conversation? Is it unnecessarily confrontational or offensive?
- **Contribute**: Online learning is not passive. It is expected that you will share your knowledge and insight. Be an active contributor to the learning community.
- **Be Forgiving**: If someone makes a mistake or does something inappropriate, address it privately and politely. You can always let the instructor know and ask them to address it as well

Accessibility and Accommodations:
At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations.

Confidentiality of Student Records:
Policies available at http://www.registrar.arizona.edu/personal-information/family-educational-rights-andprivacy-act-1974-ferpa?topic=ferpa

University-Wide Policies Links:
Links to the following UA policies are provided here, https://academicaffairs.arizona.edu/syllabus-policies:

- **Absence and Class Participation Policies**
- **Threatening Behavior Policy**
- **Accessibility and Accommodations Policy**
- **Code of Academic Integrity**
- **Nondiscrimination and Anti-Harassment Policy**
- **Subject to Change Statement**

Evaluation of Students:

- **Checkups/Quizzes**: Each non-exam week will have a short quiz that contains a maximum of 5 problems based upon the topics covered during the week before, unless otherwise noted. Each quiz will worth 5 points and be delivered through the Gradescope that can be accessed through the Calendar tab. Each quiz will be made available at 12AM (MST) each Friday and will close at 11:59PM (MST) that same day. When a quiz is stared, there will only be 20 minutes to complete it. Students may use the textbook and notes on all quizzes, but peer collaboration of any kind is not allowed. You may use a graphing calculator, R, or R Studio on each quiz. Grading disputes regarding a quiz must be addressed within one week after the quiz has been returned. Quizzes make up 10% of the final grade.

- **Group Participation**: 5 points will be awarded weekly for regular use of the discussion board. Ten groups of 6 students will be preassigned and will remain throughout the duration of the semester. Each group will have its own discussion board accessible on the D2L course page that may be used to get homework help, study help, etc. In fact, it is encouraged that the discussion board be used to complete weekly assignments. An active participation is expected by each team member, with a minimum of two posts per week which. All discussion board posts must be completed by Sundays at 11:59PM (MST). Each post must either be a thoughtful question from the class or the homework, a response to a group member's question, a helpful tip or suggestion, or a post responding to the topic of the week. Each post will be worth 2.5 points if it adds to the conversation. Simply saying "Thank you – that is helpful" will not count as a post. Please note that if a question has already been answered by another group member, then posting the same (or similar) response does not count as one of the two required posts. In addition, posting the solution to a question without any provided commentary that helps relay the reasoning taken within each line does not count as a thoughtful post in the discussion board. Group participation makes up 10% of the final grade.

- **Homework/Worksheets**: Handwritten homework showing all work with proper notation, and occasionally, a corresponding RMD fille containing all appropriate R code, will be submitted each week. Each assignment will be worth 10 points and will be generally 4 problems with several parts that are designed to deepen and integrate your knowledge. To be eligible for full credit, all work must be shown, neatly and clearly, for each problem (and their sub-problems); writing down a solution without any work to substantiate its value will not receive full credit. Homework should be submitted individually to Gradescope each week on Tuesday by 11:59 PM (MST), unless otherwise listed on the D2L course calendar. Homework makes up 20% of the final grade.

  Note About Late Assignments: Permission in writing to turn in late homework for full credit must be arranged in advance (typically for reasons that I would excuse an absence from class - Dean's excuses, illness, significant life events). Otherwise, late submissions for quizzes and homework will be accepted up to two days late at an increasing penalty, unless special arrangements are made with the instructor.

- **Project**: Students will also design and complete a project that analyzes data using statistical software. See guidelines posted on the D2L course page. The project grade will consist of 4 graded submissions to Gradescope. The project makes up 10% of the final grade.

- **Midterm Exams**: We will have 2 in-class midterm exams (tentative dates are Tuesday 3/2 and Tuesday 4/20). Each exam will be worth 100 points and will take place live online during our regularly scheduled class meeting time. Each exam will be written to be completed within the regular class time and will be delivered using Gradescope. To be eligible for full credit, all work must be shown, neatly and clearly, for each problem (and their sub-problems); writing down a solution without any work to substantiate its value will not receive full credit. Upon completion of the exam, students are expected to upload all solutions to Gradescope before "checking out". Each exam is closed book and closed computer, meaning the use of R and/or RStudio is not allowed, although you will be allowed one side of one 8.5"x11" notecard during the exam. Peer collaboration of any kind is not allowed during the exams. Each exam will be proctored using Zoom in Gallery Mode, with video sharing. Any student who has concerns about sharing video during an exam must meet with their instructor at least two weeks prior to the exam to discuss options. This is not a conversation that can

take place immediately prior to an exam. If you miss an exam for any reason, contact your instructor as soon as possible. In general, there will be no make-up exams without prior arrangement with the instructor. However, a make-up exam may be given in exceptional circumstances. Approval in these cases is at the sole discretion of the instructor and/or the dean of students, and decisions will be made on a case-by-case basis. Failure to contact the instructor within 24 hours upon missing the exam will result in a grade of zero on the exam. This may require providing a detailed account of the situation. In-class exams make up 25% of the final grade.

- **Final Exam**: The final exam is a comprehensive exam that is closed book, closed notes, and closed computer, meaning the use of R and/or RStudio is not allowed. It is scheduled for Tuesday, May 11 from 8AM – 10AM (MST). The procedures for the final exam will be the same as the midterm exams, with the exception for the length of the exam. The final exam makes up 25% of the final grade.

  The University's Exam regulations and Final Exam Schedule will be strictly followed https://registrar.arizona.edu/courses-catalog/final-examination-schedule-spring-2021.

Grading Scale:
Your final grade will be determined by the following percentages:

- Checkups/Quizzes – 10%
- Group Participation – 10%
- Project – 10%
- Homework – 20%
- Midterm Exams – 25%
- Final Exam – 25%

Grades will be given on the usual scale **A** is 90% - 100%, **B** is 80% - 89%, **C** is 70% - 79%, **D** is 60% - 69%, and **E** is below 60%. The instructor may move these cutoff values down. No extra credit or bonus points are offered for this course.

Dispute of Grade Policy:
Any questions regarding the grading of any assignment, quiz, or exam need to be cleared up within one week after the graded item has been returned.

Incomplete or Withdraw:
If you fail to complete the course due to circumstances unforeseen, then you may qualify for a grade of I, incomplete in accordance with University Policy. Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete and http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal, respectively.

You may drop the class without a W through January 26 using UAccess. While the class will appear on your UAccess record, it will not appear on your transcript. You may withdraw with a W through March 30 using UAccess. The University allows withdrawals through March 31, but only with the Dean's approval. Late withdraws are dealt with on a case-by-case basis, and requests for late withdraw without a valid reason may or may not be honored.

Accessibility and Accommodations:
At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations.

Reading Days:
Per the University, in order to allow for rest and recharge, no exams should be scheduled, and no assignments should be due on the reading day or the following day.

Additional Resources for Students:

- **UA Academic policies and procedures** are available at http://catalog.arizona.edu/policies
- **Student Assistance and Advocacy information** is available at http://deanofstudents.arizona.edu/student-assistance/students/student-assistance
- **Academic advising**: If you have questions about your academic progress this semester, or your chosen degree program, please note that advisors at the Advising Resource Center can guide you toward university resources to help you succeed.
- **Life challenges**: If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office can be reached at 520-621-2057 or DOS-deanofstudents@email.arizona.edu.
- **Physical and mental-health challenges**: If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call (520-621-9202. For After Hours care, call (520) 570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.
- **Confidentiality of Student Records**: https://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa

Subject to Change Statement:
Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

Tentative Schedule:
Per the University, in order to allow for rest and recharge, no exams should be scheduled, and no assignments should be due on the reading day or the following day.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
10-Jan	11-Jan	12-Jan	13-Jan	14-Jan ***Session 1:*** *Course Introduction*	15-Jan	16-Jan
17-Jan	18-Jan	19-Jan ***Session 2:*** *Displaying Data*	20-Jan	21-Jan ***Session 3:*** *Describing Distributions with Numbers*	22-Jan **Quiz 1 Due**	23-Jan
24-Jan **Discussion Board Week 1 Due**	25-Jan	26-Jan ***Session 4:*** *Correlation and Regression I* **Homework 1 Due**	27-Jan	28-Jan ***Session 5:*** *Correlation and Regression II*	29-Jan **Quiz 2 Due**	30-Jan
31-Jan **Discussion Board Week 2 Due**	1-Feb	2-Feb ***Session 6:*** *Producing Data* **Homework 2 Due**	3-Feb	4-Feb ***Session 7:*** *Basics of Probability*	5-Feb **Quiz 3 Due**	6-Feb
7-Feb **Discussion Board Week 3 Due**	8-Feb	9-Feb ***Session 8:*** *Conditional Probability & Independence* **Homework 3 Due**	10-Feb	11-Feb ***Session 9:*** *Random Variables & Distribution Functions*	12-Feb **Quiz 4 Due**	13-Feb
14-Feb **Discussion Board Week 4 Due**	15-Feb	16-Feb ***Session 10:*** *RVDF & Expected Value* **Homework 4 Due**	17-Feb	18-Feb ***Session 11:*** *Expected Value*	19-Feb **Quiz 5 Due**	20-Feb
21-Feb Discussion Board Week 5 Due	22-Feb	23-Feb ***Session 12:*** *Ex. of Mass Functions & Densities* **Homework 5 Due**	24-Feb	25-Feb **NO CLASS**	26-Feb **Quiz 6 Due**	27-Feb
28-Feb **Discussion Board Week 6 Due**	1-Mar	2-Mar **MIDTERM EXAM #1** **Homework 6 Due**	3-Mar	4-Mar ***Session 13:*** *Law of Large Numbers*	5-Mar	6-Mar
7-Mar **Discussion Board Week 7 Due**	8-Mar	9-Mar **NO CLASS**	10-Mar	11-Mar ***Session 14:*** *Central Limit Theorem* **Homework 7 Due**	12-Mar **Quiz 7 Due**	13-Mar
14-Mar **Discussion Board Week 8 Due**	15-Mar	16-Mar ***Session 15:*** *Estimation Intro & Method of Moments* **Homework 8 Due**	17-Mar	18-Mar ***Session 16:*** *Method of Moments & Unbiased Est.*	19-Mar **Quiz 8 Due**	20-Mar
21-Mar **Discussion Board Week 9 Due**	22-Mar	23-Mar ***Session 17:*** *Unbiased Est. & Maximum Likelihood Est.* **Homework 9 Due**	24-Mar	25-Mar ***Session 18:*** *MLE & Interval Estimation*	26-Mar **Quiz 9 Due**	27-Mar
28-Mar **Discussion Board Week 10 Due**	29-Mar	30-Mar **Session 19:** *Int. Est. & Simple Hypotheses* **Homework 10 Due**	31-Mar	1-Apr **Project Preparation and Catch Up**	2-Apr **Quiz 10 Due**	3-Apr
4-Apr **Discussion Board Week 11 Due**	5-Apr	6-Apr ***Session 20:*** *Simp. Hyp. & Composite Hypotheses* **Homework 11 Due**	7-Apr	8-Apr ***Session 21:*** *Comp. Hyp. & Ext. on Likelihood Ratio*	9-Apr **Quiz 11 Due**	10-Apr
11-Apr **Discussion Board Week 12 Due**	12-Apr	13-Apr ***Session 22:*** *Extensions on Likelihood Ratio* **Homework 12 Due**	14-Apr	15-Apr ***Session 23:*** *t Procedures*	16-Apr **Quiz 12 Due**	17-Apr
18-Apr **Discussion Board Week 13 Due**	19-Apr	20-Apr **MIDTERM EXAM #2**	21-Apr	22-Apr ***Session 24:*** *Goodness of Fit* **Homework 13 Due**	23-Apr	24-Apr
25-Apr **Discussion Board Week 14 Due**	26-Apr	27-Apr ***Session 25:*** *Analysis of Variance* **Homework 14 Due**	28-Apr	29-Apr ***Project Presentations & Review***	30-Apr **Quiz 13 Due**	1-May
2-May **Discussion Board Week 15 Due**	3-May	4-May ***Project Presentations & Review*** **Homework 15 Due**	5-May	6-May	7-May	8-May
9-May	10-May	11-May **FINAL EXAM: 8AM – 10AM (MST)**	12-May	13-May		