# ISTA 116: Statistical Foundations for the Information Age

Course Format

This course is taught in an asynchronous format with optional live-online lab sessions (you may work on the labs asynchronously if you prefer). Lectures will be pre-recorded and uploaded to D2L.

Instructor and Contact Information

Dr. Meaghan Wetherell, [wetherellm@email.arizona.edu](mailto:wetherellm@email.arizona.edu)

Online lecture guest stars include several cats, dogs, and a nosy (and sometimes noisy) husband.

The official course website will be D2L. All course related materials and announcements will be shared through D2L or official UA @email.arizona.edu email addresses.

**Office Hours:** By Appointment: <https://arizona.zoom.us/j/92836860710>

**Email Policy:** if I do not respond to your email within 48 business hours, please email me again!

Section Leaders and Contact Information

|  |  |  |
| --- | --- | --- |
| Name | Email | Section |
| Mary Kate Armstrong | [mkarms2@email.arizona.edu](mailto:mkarms2@email.arizona.edu) | A |
| Valeria Garcia | [vadelinag1@email.arizona.edu](mailto:vadelinag1@email.arizona.edu) | B |
| Jacquie Kuru | [jacquiek1k@email.arizona.edu](mailto:jacquiek1k@email.arizona.edu) | C |
| Rodrigo Guerrero | [rodrigoguerrero@email.arizona.edu](mailto:rodrigoguerrero@email.arizona.edu) | D |
| Byron Snead | [bsnead@email.arizona.edu](mailto:bsnead@email.arizona.edu) | E |
| Luke Niemann | [lhniemann@email.arizona.edu](mailto:lhniemann@email.arizona.edu) | F/Global Direct |
| Ruoyao Wang | [ruoyaowang@email.arizona.edu](mailto:ruoyaowang@email.arizona.edu) | Graduate Course Assistant |

Course Objectives

Data is everywhere in the modern world. Each of us has access to data on virtually any topic imaginable via the internet, and public and private institutions are making use of data in decision-making more than ever before. However, access to data is not the same thing as access to information. The purpose of this course is to develop some of the foundational skills needed to consume data and create information. Students will learn how to use data to ask and answer statistical questions and will practice reading and critiquing the use of statistics by others. Students will also gain a beginning competency in the coding language R and learn to troubleshoot errors and look up help for future coding endeavors.

Expected Learning Outcomes

After taking this course, students should be able to:

* Summarize and display data
* Design and analyze experiments and studies
* Assess the validity of statistical claims
* Compute confidence intervals, perform statistical hypothesis tests, and construct linear models
* Use the R programming language to automate computations
* Create basic visuals in R to illuminate data trends
* Identify and interpret impact from failing to meet assumptions in different statistical tests
* Determine and apply the right statistical test for your data

Required Materials

There are no required texts. Readings are optional and meant to supplement your understanding of the material. Unless otherwise listed, readings are from OpenIntro Statistics (<https://www.openintro.org/book/os/>)

You will be required to download R and RStudio Desktop on your computer. Both are free. If you cannot get R or Rstudio to work on your computer, you can always use RStudio Cloud. <https://rstudio.cloud/projects>

Grading Policies

Grades will be based on discussion participation, presentations, projects, and report submissions.

Lab Grades 44%

Midterm Exam 20%

Final Exam 20%

Evaluation Projects 16%

1. Lab Grades

Lab assignments will typically be due **by 6:00pm on Friday** unless otherwise stated. Late labs will be accepted without penalty if they are turned in before your section leader has finished half of the grading. Labs will not be accepted more than a week after the due date. All labs will be posted ahead of time, so you may feel free to work ahead.

There are 12 labs scheduled. Your lowest lab score will be dropped. Labs will be turned in via D2L.

1. Midterm and Final Exam

The midterm and final will be multiple choice questions administered via D2L, **due by 6:00 pm on Tuesdays**. You will be allowed to use R, your notes, and the internet for the exams (not Chegg or Coursehero or other cheating websites). You will not be allowed to work with other students. Both exams will be open for 24 hours so that you may take them when your schedule permits. The midterm will be due week 8, and the final exam will be due Tuesday of final’s week.

1. Evaluation Projects

Four times during the term you will be given a set of scenarios where a researcher has committed an ethical or research design failure that invalidates their study results. These will largely be defined off of examples I have personally seen but may not focus on quite as serious of topics. For each of these evaluation projects you will be given the scenarios and the data to look at for a few days, then a quiz will open for 24 hours and you will enter your answers as multiple choice responses. Projects will be **due by 6:00 pm on Tuesdays** unless otherwise stated. You may work together but cannot copy each other's answers.

1. Extra Credit

We will have a few extra credit challenges over the course of the term, so keep an eye out for those!

Scheduled Topics/Activities

These are generalized weekly themes. Suggested supplemental readings are listed.

Week 1: What type of data is this, and how do I look at it?

* *OpenIntro 1.2, 2.1*

Week 2: How much data do I need to have and how can I tell?

* *OpenIntro 1.3, 3.5, 4.1*

Week 3: Is this data normal?

* *OpenIntro 5.1*

Week 4: Are these samples from the same population?

* *OpenIntro 7.1, 7.3*

Week 5: Did I collect enough data?

* *OpenIntro 7.4*

Week 6: What happens if I do too many tests?

* *OpenIntro 7.5*

Week 7: How do I pick the right test?

* *OpenIntro 4.1-4.5*

Week 8: Categorical data visualizations

* *OpenIntro 2.2*

Week 9 - 10: Are these categories from the same population?

* *OpenIntro 3.1, 4.3, 6.3*

Week 11-13: Are these two variables related?

* *OpenIntro 8.1-8.4*

Week 14: Are these three or more variables related?

* *OpenIntro 9.1-9.4*

Week 15: Does this variable impact the likelihood of this event?

* *OpenIntro 9.5*

Week 16: Research Design and Ethics

* [*https://www.amstat.org/asa/files/pdfs/EthicalGuidelines.pdf*](https://www.amstat.org/asa/files/pdfs/EthicalGuidelines.pdf)

Week 17: All the other things statistics contained: a sampler of statistics!

* *OpenIntro 3.2*

Netiquette Guidelines

This is an online, asynchronous course. There are discussion boards available for talking to the other members of your lab group, which you are encouraged to take full use of. Because so much of this course is online, here are some important netiquette tips:

1. Remember that ALL CAPS is usually interpreted as yelling
2. Sarcasm almost never comes across well online
3. Be professional, and remember to think before you type – comments made in person can be forgotten, but discussion board comments are there forever
4. Professionalism extents to your D2L cover photo – please use common sense in the image you choose
5. This is a place for working with fellow students, not whining – it's not a Yelp review board, and misuse of it can get you kicked off

Absence, Participation and Makeups Policy

* Participation is an important part of the learning process. You will be expected to watch all lectures. Some lectures will ask you to try an activity; these will not be graded, but you are expected to do them as they are important learning opportunities.
* I typically do not take off points for late assignments. I either accept them because you have a good reason for the delay and it does not cause an undue burden on me, or on your grader, or on your classmates to grade it – or I do not accept your late assignment. Pay attention to the late policy for each type of item for details.
* Makeups for reasonable cause (i.e. you missed an exam because of COVID-19) will be determined on a case-by-case basis. The sooner you contact me, the easier both our lives will be. Labs cannot be made up more than a week after the deadline.
* For a lab, project, or exam to be graded you MUST hit submit. If you start a lab but forget to submit it, we will not grade it.

For University of Arizona’s policies on attendance, please see the following links:

* The UA’s policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>
* The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable is available at: <http://policy.arizona.edu/human-resources/religious-accommodation-policy>
* Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

Administrative Drop Policy

Students who miss more than three labs in a row without speaking to me or their section leader may be administratively dropped so that they get a W and not an F.

Plagiarism and Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

Plagiarism is defined as taking someone else’s working and using it as your own without giving credit. I encourage you to use the resources at your disposal to find answers to questions, but that does not mean you can copy paste google results or your colleague’s answers. If your answer is not written in your own voice, that is not learning the material – it is plagiarism, and it is both lazy and against the Code of Academic Integrity.

For code, collaboration is allowed and encouraged and the internet is full of helpful resources. However, if you do work with others or get code from others without substantial changes, you must state this in your program documentation. Otherwise, you are representing the work of others as your own. Any use of plagiarism in your writing or your code will result in a failure of the assignment. For labs, you are encouraged to work together but the code you submit must be unique, unless otherwise stated.

Selling or submitting class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor’s express written consent (**yes, this means CourseHero and similar venues**). Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement. The University Libraries have some excellent tips for avoiding plagiarism, available at <http://new.library.arizona.edu/research/citing/plagiarism>.

****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. Disabilities are defined as a mental or physical condition that substantially limits one or more major life activity – this can include depression, anxiety, or other mental illness. I have worked in disability advocacy and been partially disabled in the past, and I am happy to help you as much as I can.

Course Competencies

This course should help you meet the following undergraduate student competencies (<https://ischool.arizona.edu/undergraduate-student-competencies>): F1.2, EV3.1, EV3.2, DAIBSS2.1, DAIBSS2.3, DAISBA2.2, DAISBA2.3, DAISBA2.4.

*Below are items found on every University of Arizona Syllabus. They are important, but I have not changed them from the stock items so you may have read them before.*

General University Info

* 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>
* The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>
* The University of Arizona’s 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>
* Your records are confidential, please see FERPA for more information: <http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>

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.).

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.