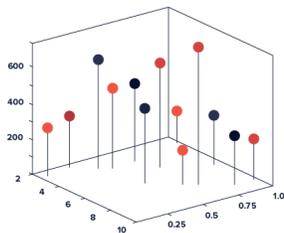
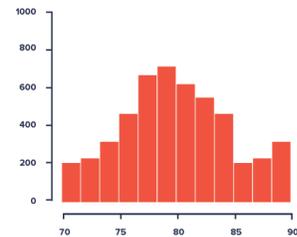


STAT 216: INTRODUCTION TO STATISTICS

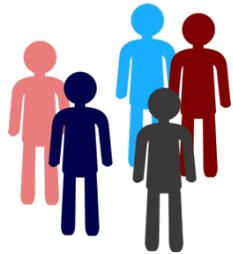
UNIVERSITY OF MONTANA
FALL, 2020



DATA HAVE
VARIANCE



DISTRIBUTIONS ARE
THINGS



WE ONLY GET
ONE SAMPLE



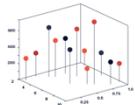
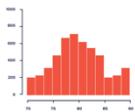
THERE IS REGULARITY
IN RANDOMNESS

ABOUT THE COURSE

“Statistics” is often associated with a particular kind of mathematical *content* to be learned—vocabulary, symbols, formulas, etc. In this course, we will explore what it means to think about statistics as a way of *making sense of the world*.

BIG IDEAS

The heart of the class is understanding four big ideas:

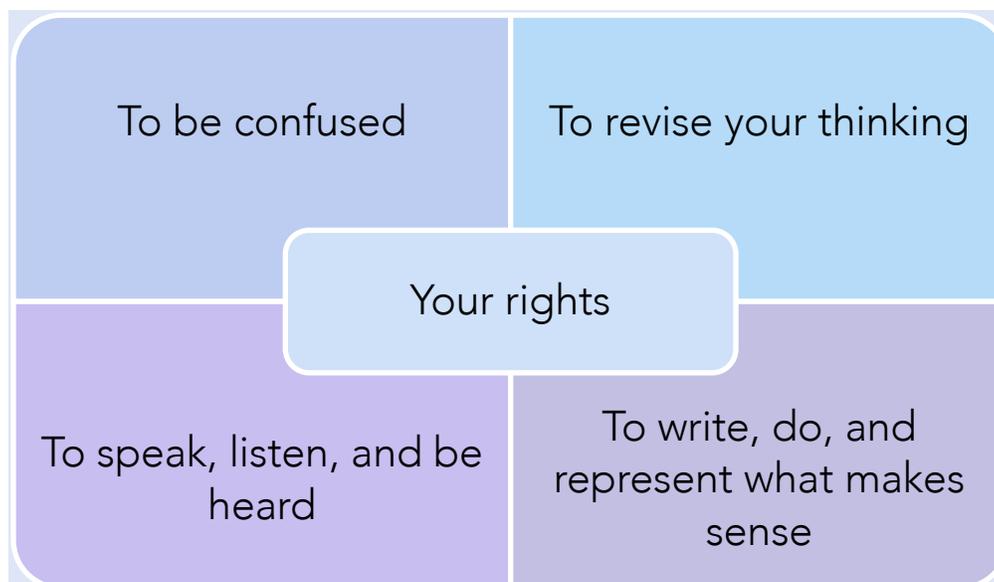
-  1. Data have variance
-  2. Distributions are things
-  3. We only get one sample
-  4. There is regularity in randomness

LEARNING OUTCOMES

Upon successful completion of STAT 216, a student will be able to apply effectively statistical reasoning to a variety of applied or theoretical problems, including:

1. be able to describe distributions numerically, graphically, and verbally.
2. be able to use and interpret a linear model for the relationship between two variables
3. know the basic principles of good experimental design and good sampling design
4. know the fundamental ideas of statistical inference for means and proportions including both hypothesis testing and confidence intervals.
5. be able to interpret confidence intervals and p-values in the context of real problems.
6. be a critical consumer of statistical studies reported in the media.

YOUR RIGHTS



YOU HAVE THE RIGHT TO BE CONFUSED. Being confused is actually a good thing. Feeling confused is an important part of learning. If you are confused, don't try to hide it. Exercise your right! Say, "I don't understand this... yet."

YOU HAVE THE RIGHT TO REVISE YOUR THINKING. Nothing is set in stone. You may notice that you made a mistake. Claim it! You may get some feedback. Respond to it! Learning is a process and revision is an important part of that process.

YOU HAVE THE RIGHT TO SPEAK, LISTEN, AND BE HEARD. Learning and doing statistics is a social enterprise. We will offer multiple ways for you to communicate and collaborate with others.

YOU HAVE THE RIGHT TO DO ONLY WHAT MAKES SENSE. Math should make sense. If you find yourself doing something, but you can't really explain why, then claim your right and stop. Do what makes sense to you. This is not to say that anything goes. You may get some feedback which causes you to revise your thinking. This also means that you have the right to use words and symbols that make sense to you. We will introduce new vocabulary and symbols in this class, and we'll help you learn to use them. As you are learning, please use language that makes sense to you.¹

¹ These are based on work by Olga Torres (<https://www.youtube.com/watch?v= UndpNUCAqw>) and Crystal Kalinec-Craig (<https://embracinglifewithmajorrevisions.org/rights-of-the-learner-blogs/>)

COURSE FORMAT AND MEETING TIMES

3 lectures/week: MWF 10:00-10:50am. Lectures are held remotely via Zoom. Lectures are live and interactive. Information for how to attend lectures will be provided via email and posted on the course Moodle site.

1 discussion/lab section per week: Thursday at the times listed below. Recitations are activity based.

Attendance is mandatory in lectures and discussion sessions.

Section	Instructor	Time and location	Location
Lectures	Fred Peck	MWF 10:00 – 10:50	Remotely through Zoom
Recitation 01	Fred Peck	Th 8:00 – 8:50	UC 220
Recitation 02	Ian Derickson	Th 9:00 – 9:50	ISB 110
Recitation 03	Ian Derickson	Th 10:00 – 10:50	ISB 110
Recitation 04	Ian Derickson	Th 11:00 – 11:50	UC 302
Recitation 05	Kurt Swimley	Th 12:00 – 12:50	MCG 210
Recitation 06	Kurt Swimley	Th 1:00 – 1:50	MLIB 410
Recitation 07	Kurt Swimley	Th 2:00 – 2:50	MLIB 410
Recitation 08	Fred Peck	Th 11:00 – 11:50	Remotely through Zoom

COURSE WEBPAGE

<http://moodle.umt.edu>

We will use Moodle as our “central meeting place.” Assignments, discussions, data sets, handouts, etc... will be posted there. Please plan to check the Moodle site often.

ZOOM LINK

Please use the Zoom link below to access any aspects of the course that are conducted remotely:

<https://umontana.zoom.us/j/95860949309?pwd=YW9XOUZiMjFrMm5ZVTAvRCsxcXRtUT09>

PEOPLE: INSTRUCTORS, CONTACT INFORMATION, OFFICE HOURS

Fred Peck (he/him)



Sections: Lectures, 01, 08

Contact: frederick.peck@umontana.edu

Office hours:

- Thursdays, 2-4 via Zoom. Use the same link as for the lectures: <https://umontana.zoom.us/j/95860949309?pwd=YW9XOUZIMjFrMm5ZVTAvRCsxcXRtUT09>
- We can meet anytime (in person or via Zoom) that is convenient for you. Schedule at www.fapeck.com/meeting

Ian Derickson (he/him)



Sections: 02, 03, 04

Contact: ian.derickson@umontana.edu

Office hours:

- Mondays 1-3 in Corbin 356
- Or set up an appointment by email: ian.derickson@umontana.edu

Kurt Swimley (he/him)



Sections: 05, 06, 07

Contact: kurt.swimley@umontana.edu

Office hours:

- Wednesdays 1-3 in LA 410
- Or set up an appointment by email: kurt.swimley@umontana.edu

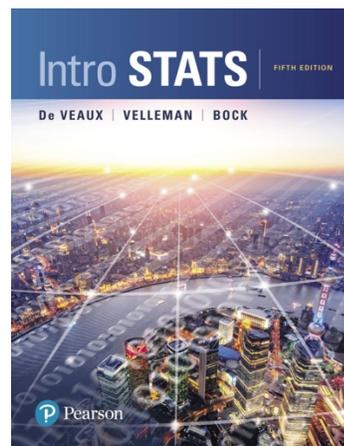
You can ask any of us for help, and attend any of our office hours!

TEXTBOOK

Intro Stats (5 ed.),

by DeVeaux, Velleman, & Bock.

You automatically have access to the online textbook and resources through Moodle (unless you choose to opt out of the tuition billing system).



SOFTWARE

We will use the following software packages:

- Rossman/Chance applets: Browser based applets for simulation and data analysis, located at <http://www.rossmanchance.com/applets/>
- CODAP: CODAP is a web-based platform for data analysis, located at <https://codap.concord.org/app>
- myStatLab: We will use MyStatLab for online PPE and Check-Ins (see next page), and to access the course text book. You can access MyStatLab through our course Moodle page. MyStatLab requires an access code, which comes with the textbook.
- Zoom: We will use Zoom for lectures and remote recitation sections.

A NOTE ABOUT COMPUTERS AND TECHNOLOGY:

You will need access to a computer to attend the lectures, access readings, and engage with statistical software. I recognize that some students are unable to afford the cost of purchasing a computer. I also recognize that technology problems can be a significant source of stress for students. I want to help. ***Please contact me if you have a challenge accessing a computer.*** That way I can help you access support.

COURSE ACTIVITIES AND DELIVERABLES



IN-CLASS ACTIVITIES AND DISCUSSION: Education researchers have spent decades studying how people learn math and statistics. The research is clear: **we learn more when we are actively engaged than when we are passively listening to a lecture**. Therefore, lectures and recitations will involve “active learning” including activities and discussion.

- We do not expect that you will “know” how to do every activity. In many cases, you won’t! That’s because we will often ask you to engage in activities in order to learn something new.
- We do expect that you will engage deeply and thoughtfully in class activities, and that you exercise all of your rights as a learner.



PRACTICE, PREPARATION, AND EXTENSION ACTIVITIES: PPE activities are done outside of class. We will have both online PPE (via MyStatLab) and offline (written) PPE activities. You can work together on the PPE activities and use any resources that are helpful.

PPE activities are basically a sandbox: a place for you to try things out and see how they work. In order for this to be successful:

- *You have to engage thoughtfully with every problem.* Some problems may be challenging! You may be confused! That’s okay! Remember, you have the right to be confused. The activities are a sandbox, a place to play. They are not an evaluation.
- *You have to get some feedback.* Online activities will provide feedback immediately. For written activities, solutions will be posted and you can compare your solutions to the posted solutions
- *You have to engage with the feedback.* For online activities, you can use the immediate feedback to reattempt the problem. For written activities, you will correct your own assignments, including making notes to yourself. We will provide more details about how this works in the first recitation meeting.
- *You have to get help.* If, after getting feedback, you are still confused about something, congratulations! This is a very important part of learning. The key is that, when you are confused, you seek help. You can attend any office hours of any instructor. Office hours are posted on Moodle. You can also seek help from the Math Learning Center. See the section on Help, below.



CHECK-INS: Each week, we will have an online check-in. The point of a check-in is to give you and us feedback on how you are understanding the concepts that week.

- You can use any resources you want on your check-ins, but you should please complete them by yourself.
- Check-ins are graded, but they represent a very tiny part of your overall grade. The point is to get some information, not to evaluate you. That said, if we notice that you have a low score on a check-in, we will ask you to come into office hours to get help.



STATISTICAL INVESTIGATIONS: There are three statistical investigations, one for each unit. The investigations will be assigned at the beginning of each unit, and they are due one week after the end of the unit. We will provide more information about investigations in the first or second recitation meeting, when the investigation for Unit 1 is assigned.

- **You may use any resources, including other people,** to help you with your investigations.
- Remember, you have the right to revise your thinking. **You may revise and resubmit your investigations for full credit, based on feedback.**

GRADING

Your grade is based on the following:

- Participation in course activities (50%)
 - Attendance in lectures and recitations
 - Thoughtful completion of PPE activities
- Check-ins (5%)
- Investigations (45%)

Letter grades will be assigned based on the standard 90-80-70 scale. Because you have the right to revise, your grade is literally in your hands.

TENTATIVE SCHEDULE

<i>Unit</i>	<i>Topics</i>	<i>Approximate dates</i>
<p>Unit 1:</p>  <p>Data have variance!</p>  <p>Distributions are things!</p>	<ul style="list-style-type: none"> • Representing distributions numerically and graphically • Summarizing distributions: Shape, center, and spread • Using the normal model • Linear regression • Multiple regression 	<p>August 19 – September 18</p>
<p>Unit 2:</p>  <p>We only get one sample!</p>  <p>There is regularity in randomness!</p>	<ul style="list-style-type: none"> • Collecting data for generalizability and causality • Chance processes • Assessing the strength of the evidence through simulation • Estimating a range of compatible values through simulation 	<p>September 21 – October 23</p>
<p>Unit 3:</p> <p>Theory-based models for inference and estimation</p>	<ul style="list-style-type: none"> • Using the normal model for inference for proportions • Using the t model for inference about means • Comparing two means 	<p>October 26 – November 25</p>

HELP!

There are many ways to get help in this course:

- Office hours. You can attend the office hours of any of the instructors. Up-to-date office hours are posted on Moodle
- The Math Learning Center, in the math building on the oval, offers free drop-in tutoring. The hours will be posted on Moodle.

OUR COLLECTIVE RESPONSIBILITY TO PROMOTE PUBLIC HEALTH

We are experiencing a global pandemic. We are called upon to engage in practices to promote collective wellbeing and public health.

- Mask use is required within the classroom. View UM's face covering policy: <https://www.umt.edu/coronavirus/mask-policy.php>
- We have all been provided with a Healthy Griz kit. Everyone is expected to clean their personal work space when they arrive for class, and again before they leave the classroom.
- Refill stations for cleaning supplies/hand sanitizer will be set up around campus - please learn where they are and use them.
- Classrooms may have one-way entrances/exits. Please follow posted guidance.
- Please try not to congregate outside the classroom before and after class.
- Unless there is a health rationale, drinking and eating food (which requires mask removal) is not allowed within the classroom.
- Stay home and contact the Curry Health Center at (406) 243-4330 if you feel sick and/or if exhibiting COVID-19 symptoms.
- If you are diagnosed with COVID-19, follow instructions for quarantine and contact your advisor so they can help you stay on track academically.
- Please remain vigilant outside the classroom and help mitigate the spread of COVID-19.
- You can find up-to-date information on the UM coronavirus website: <https://www.umt.edu/coronavirus>

Let's all care for each other.

OTHER POLICIES

COMMUNICATING: Email is the best way to reach your instructors. UM policy states that we must use your UM email account when we correspond with you. Please email us from your UM account—that makes it easy to follow the policy! Even if you don't, we still have to reply to your UM account.

CLASSROOM AND TESTING ACCOMMODATIONS: The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

ACADEMIC HONESTY: All students need to be familiar with the Student Conduct Code. You can find it in the "A to Z Index" on the UM home page. All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.

A FINAL NOTE: THE IMPORTANCE OF OUR COLLECTIVE WELLBEING

This is a challenging and uncertain time for all of us. Even as we gather together to learn statistics, our priority is our collective wellbeing. Please act gracefully and patiently with each other. We may experience sudden changes. We will have to face these changes with grace, understanding, and flexibility. If you experience life challenges that get in the way of your participation in the class, please let us know. We promise to be understanding and to work with you. Again, our priority is your physical and emotional health.