

**Syllabus**  
**STAT 422, Mathematical Statistics**  
**Spring 2021, MWF 9:00-9:50am in Math 211 (& Online)**

**Course Information:**

- **Instructor:** Jon Graham, Math 204, 243-2561, jgraham@mso.umt.edu.
- **Textbook:** *Probability and Statistics*, by DeGroot & Schervish, 4<sup>th</sup> ed.
- **Office Hours:** To be announced, By appointment
- **Course Webpage:** Accessed through Moodle
- **Grading:** Homework: 30% Exams 1,2: 40% Final: 30%
- **Prerequisites:** STAT 421 (Probability Theory)

**Homework**

Homework will typically be assigned every Friday, to be submitted to a private Box folder by 9:00am the following Friday. **NO LATE HOMEWORK WILL BE ACCEPTED FOR ANY REASON**, and the lowest homework grade will be dropped. Homework is not only a fairly substantial portion of your grade, but is vital to your success in this class. Working with other students on homework is encouraged, as long as you hand in your own work, and do not simply copy someone else's work. Solutions to all problems will be provided on Moodle after Friday's class.

**Exams**

Exams 1 & 2 will be cumulative and closed book. More about the exams, including the exact dates and locations of the exams will be given later. Each exam will be held at a variety of times on campus or online and students will be able to select their exam time. Rooms will be reserved to meet UM COVID protections. No make-up exams will be given without a documentable reason for missing the exam time selected.

**Final Exam**

The final exam is scheduled for Monday, April 26 from 10:10am-12:10pm. The logistics of this exam will be worked out and communicated at a later date.

**Notes**

All course notes will be provided roughly 48 hours prior to the class where they will be discussed and you will receive an Email when they are ready. Notes will both be posted on the Moodle course page and paper copies will be provided on my office door for those who want to pick up paper copies. Notes will be partially filled in with the idea that you will be filling in sections of the notes during class. This will hopefully keep you engaged during class but not scrambling to write everything down.

## Course Material and Objectives

This course builds upon the topics of probability theory, random variables and their probability distributions, studied in STAT 421. Here, we examine basic statistical theory, methods of estimation, and hypothesis testing. Some goals of this course are to provide a foundation for more advanced studies in probability and statistics, to understand how to approach and think about a problem involving data, and to demonstrate the numerous applications of probability and statistics. Throughout the course, the **R** computer package will be used both in class and in homeworks to illustrate concepts.

Questions are strongly encouraged, both during class and at office hours. If you are lost and confused, please let me know. During these unusual times, please let me know if there is more I can do to enhance your learning. I try very hard to stay in close communication with students via Email but am always open to your feedback and suggestions.

## Important Dates

**Monday, January 11:** First day of class

**Monday, January 18: Martin Luther King Jr. Day holiday**

**Wednesday, January 20:** Last day to add courses by Cyberbear

**Monday, February 1:** Last day to drop courses/change grading option in Cyberbear

**Monday, February 15: President's Day holiday**

**Thursday, March 4: Student Break – no classes (no impact on STAT 422 class)**

**Tuesday, March 16: Student Break – no classes (no impact on STAT 422 class)**

**Thursday, March 18:** Last day to drop courses. Paper form must be signed by advisor and instructor. A W will appear on your transcript. After this date, drops can only be done by with the Dean's signature.

**Friday, April 2: Student Break – no STAT 422 class**

**Friday, April 23:** Last day of class. Last day to change grading option (letter grade to CR/NCR or vice-versa). Requires paper form signed by advisor and instructor.

## Learning Outcomes

1. To be able to understand how to derive estimators and their properties, such as distribution, variance, bias, MSE, consistency and other asymptotic properties.
2. To be able to understand the theory behind confidence intervals and hypothesis tests.
3. To be able to understand likelihood theory and apply it to estimation and hypothesis testing.
4. To have an understanding of the theory behind normal-based inference procedures for one and two-sample problems.
5. To be able to use software to obtain numerical solutions to problems where analytical solutions are not possible and to carry out simulations to compare inference procedures.

## **Disability Services**

*The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. We will work with you and DSS to provide an appropriate accommodation.*

## **Academic Honesty**

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

## **Classroom Safety Information due to COVID-19**

1. Mask use is required within the classroom if you are attending class in person. The UM face covering policy can be found here: <https://www.umt.edu/policies/browse/facilities-security/covid-19-face-covering-policy>.
2. Specific seating arrangements will be used to ensure social distancing and to support contact tracing efforts.
3. Each student was provided with a cleaning kit. For those attending class, the expectation is that students will clean their personal work space when they arrive for class and before they leave the classroom.
4. Drinking liquids and eating food (which require mask removal) are discouraged within the classroom.
5. Stay home if you feel sick and/or are exhibiting COVID-19 symptoms. All lectures are video-recorded and can be watched live and accessed from the Moodle course page.
6. Please remain vigilant outside the classroom in mitigating the spread of COVID-19.
7. Up-to-date COVID-19 information from the University of Montana can be found here:
  - UM Coronavirus Website: <https://www.umt.edu/coronavirus>
  - UM COVID Spring 2021 Site: <https://www.umt.edu/coronavirus/spring2021.php>

## **Digital Access**

Digital devices (like laptops and cell phones) are becoming increasingly important to success in college. In this course, you will need a digital device to access notes and assignments, complete and submit written assignments, and take exams if not taking them in the classroom. I recognize that some students are unable to afford the cost of purchasing digital devices and that other students rely on older, more problem-prone devices that frequently break down or become unusable. I also recognize that those technology problems can be a significant source of stress for students. Given those challenges, I encourage students to contact me if they experience a technology-related problem that interferes with their work in this course.