Math 483: Mathematical Statistics
Fall 2019

Instructor: Dr. Oleg Makhnin   **Office:** Weir 238

Class: TR 11-12:15 Bureau 111A

Office Hours: M 8:30-10:30am   TR 3:30-5pm   F 1:30-3:20pm
 or whenever you can catch me!

E-mail: oleg.makhnin@nmt.edu   **Web site:** euler.nmt.edu/~olegm/483/
Phone: 835-5110

Textbook: *All of Statistics* by Larry Wasserman, Springer

Catalog description:

"Introduction to decision theory. Multivariate distributions. Sampling distributions for the normal case. Convergence of random variables. Different methods of estimation. Principles of hypothesis testing."

The main goal is to familiarize you with theoretical concepts behind modern statistical practice. However, we will also pay attention to data examples using R statistical software, and simulation as a powerful inferential tool.

COURSE POLICY

- Grading is based on
    1. Homework (about 10 assignments),
    2. Two exams, which will be announced at least one week ahead of time,
    3. Comprehensive final exam or a Project.

        Your grade is based on the percentage of total points earned (the individual tests and homework are **not** assigned a letter grade).

- **Homework:** All homework is due either during the lecture or to the instructor's office by 5pm on the due date. One lowest score will be dropped.

- A make-up test could be given only in an exceptional situation with a documented evidence of excused absence.

- You are encouraged to seek help from the instructor.

Distribution of points (tentative):
Homework: 30%   Tests: 40%   Final exam (comprehensive) or Project: 30%

Grading scale (tentative):

A above 90%   B 80-90%   C 70-80%   D 60-70%   F below 60%
Plusses and minuses will be given

Course outline (tentative):

1. Probability review (Chapters 1-3)

2. Convergence of random variables (Ch. 5)

3. Statistical inference

   Ch. 6 : Nature of Statistical Inference
   Ch. 7 : CDF
   Ch. 8 : Bootstrap (a little bit)
   Ch. 9 : Parametric Inference: mostly Maximum Likelihood
   Ch.10 : Hypothesis testing
   Ch.11 : Bayesian inference
   Ch.12 : Decision theory

   additional material: Student's theorem, T and Chi-square distributions

4. Statistical Models

   Ch.13 : Regression
   Ch.15 : Two-way tables

   other models as time allows

The instructor reserves the right to change any part of this syllabus as he sees fit.

Course Learning Outcomes:

By the end of this course, students will learn some multivariate distributions, sampling distributions for the normal case, the basics of decision theory and random variable convergence. They will understand the basics of parameter estimation and principles of hypothesis testing, including Fisher's information and Wald tests. They should be able to apply these methods in practical situations.

Program Learning Outcomes:

Learning objectives for the math departments undergraduate and graduate degree programs can be found at
http://infohost.nmt.edu/~math/about/learningoutcomes.html

Cell phones:

To help make our emergency response as effective as possible, we require that cell phones be set on "vibrate." The reason: if all phones vibrate at the same time during your class, you know there is an emergency that must be responded to immediately. If there is such an emergency, you and your students need to know this without delay.

Academic Honesty

New Mexico Tech's Academic Honesty Policy for undergraduate and graduate students is found in the student handbook, which can be found at:
http://www.nmt.edu/student-handbook
You are responsible for knowing, understanding, and following this policy.

Collaborating on homework is ok, but in the end, each student should write their own solution.

Reasonable Accommodations:

New Mexico Tech is committed to protecting the rights of individuals with disabilities. Qualified individuals who require reasonable accommodations are invited to make their needs known to the Office of Counseling and Disability Services (OCDS) as soon as possible. To schedule an appointment, please call 835-6619.

Counseling Services:

New Mexico Tech offers mental health and substance abuse counseling through the Office of Counseling and Disability Services. These confidential services are provided free of charge by licensed professionals. To schedule an appointment, please call 835-6619.

Respect Statement

New Mexico Tech supports freedom of expression within the parameters of a respectful learning environment. As stated in the New Mexico Tech Guide to Conduct and Citizenship: "New Mexico Tech's primary purpose is education, which includes teaching, research, discussion, learning, and service. An atmosphere of free and open inquiry is essential to the pursuit of education. Tech seeks to protect academic freedom and build on individual responsibility to create and maintain an academic atmosphere that is a purposeful, just, open, disciplined, and caring community."

Title IX Reporting:

Sexual misconduct, sexual violence and other forms of sexual misconduct and gender-based discrimination are contrary to the University's mission and core values, violate university policies, and may also violate state and federal law (Title IX). Faculty members are considered "Responsible Employees" and are required to report incidents of these prohibited behaviors. Any such reports should be directed to Tech's Title IX Coordinator (Dr. Peter Phaiah, 20D Brown Hall, 575-835-5187, titleixcoordinator@nmt.edu.) Please visit Tech's Title IX Website (`http://www.nmt.edu/titleix`) for additional information and resources.