

Math 382: Probability and Statistics

Fall 2021

Instructor: Dr. Oleg Makhnin **Class:** TR 9:05-10:20, Cramer 101

Office: Weir 238

Office Hours: M 8:30-10:30am TR 3:30-5pm F 2:30-3:20pm

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Textbook: Probability and Statistics for Engineers and Scientists, 9th ed., by
Walpole, Myers, Myers and Ye

Office Hours:

Office hours are both via Zoom and walk-in (in Weir 238). If you join via Zoom, you might also phone my office (575-835-5110) so I will know to check Zoom! Zoom meeting ID's will be available from Canvas.

Mode of Instruction:

This class is in-person but I will also provide a Zoom meeting. Meeting link:
<https://zoom.us/j/98889059465?pwd=a0J4S3hSUk1LQU1pNm1XUkZ50FQ2dz09>

The class participation is encouraged: in the form of asking questions, answering my questions, suggesting improvements etc. The class will also be recorded for later viewing. The list of videos is available from Canvas (under Panopto Recordings).

Objectives:

1. To learn ideas of probability
2. To learn basic concepts and applications of statistical inference
3. To learn how to construct and apply probability models in science and engineering

Pre-requisites: Calculus II, some knowledge of set algebra (review)

COURSE POLICY

1. Grading is based on
 - (a) Homework and quizzes
 - (b) Two hourly exams, which will be announced at least one week ahead of time

(c) Comprehensive final exam

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

2. There will be some quizzes during class, announced in advance. You will take the exams and quizzes on paper.
3. Regular homework is important! Homework is usually due by 11pm of the target date. Completed and scanned (or typed-up) assignments should be submitted on Canvas.

NO LATE homework is accepted but the lowest 2 homework/quiz grades will be excluded.

4. In order to make up any assignment, a valid excuse should be documented. The instructor decides if an excuse is a valid one.
5. For advanced students, the sets of “challenge exercises” will be available. Completed challenge exercises, together with excellent class record, may lead to the waiver of the final exam.

Distribution of Scores:

Tests: 200 pts. Homework and quizzes: 150 pts. Final: 150 pts.

Grading scale(tentative):

A above 90% B 80-90% C 70-80% D 60-70% F below 60%

Plusses and minuses will be given.

Grades on Canvas: the scores for individual assignments should be correct, however the summaries (e.g. averages) should be taken with a grain of salt.

Lab

Lab (Math382L) is formally independent of this course, and your lab grade will be separate from the course grade. It is possible to take this course without taking the lab, or vice versa. However, taking labs should help better understand the concepts and their applications.

Advice

Like most math courses, this course is cumulative. For this reason, try not to fall behind. Any difficulties must be resolved quickly. You can get help from your instructor, or use OSL/ Math Help Room. Regular class attendance, taking notes and participating in class discussions are expected.

Topics (tentative):

Week	Tuesday	Thursday
1	Intro, Ch.1 Stats. Hw1	2.1-2.3 Set notation, counting. Hw2
2	2.4-2.5 Probability rules. Hw3	2.6-2.7 Conditional probab. Hw4
3	2.8 Bayes' Rule. Hw5	3.1-3.3 Random vars Hw6
4	4.1-4.2 Mean and Variance (discrete). Hw7	5.1-5.3 Binomial RV. Hw8
5	5.4 Hypergeometric RV. Hw9	5.5 Negative Binomial RV. Hw10
6	5.6 Poisson RV. Hw11	Review
7	Exam 1	4.1-4.2 Mean and Variance (continuous), Hw12
8	6.1-6.3 Normal RV. Hw13	6.4-6.5 Normal RV cont'd. Hw14
9	6.6-6.7 Gamma and Exponential. Hw 15	3.4 Joint Distributions. Hw16
10	4.2 Covariance 4.3 Mean/Var of sums. Hw17	Review
11	Exam 2	8.1-8.3 Stats and Graphical methods. Hw18
12	8.5 Central Limit Theorem. Hw19	9.4 CI for mean. Hw20
13	9.8 CI for 2 means. 9.10 CI for proportion. Hw21	10.2-10.5 Hypothesis test for mean. Hw22
14	10.8 Hyp.test 2 means 10.11 Proportion. Hw23	11.1-11.3 Regression. Hw24

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: <https://www.nmt.edu/studenthandbook/nmt-student-handbook.pdf>

You are responsible for knowing, understanding, and following this policy.

Homework: collaborating on homework is ok, but you have to write your own final solution. Carbon copy of someone else's solution is not acceptable!

Quizzes/Exams: quizzes are "open notes" and you can use a formula sheet for the exam. Needless to say, students are expected to do their own work.

COVID-19 Safety Issues for Face-to-Face Instruction:

As of the beginning of Fall semester, NMT classes are under the following constraints, which may change as COVID conditions and/or New Mexico Governor's orders change. Please check for daily updates of COVID constraints, posted on www.nmt.edu/covid19/.

1. All vaccinated and unvaccinated individuals are required to wear a face mask indoors anywhere on campus. It is anticipated based on prior Governor's orders that, when conditions improve individuals who have not been fully vaccinated will still be required to wear a face mask and to social distance indoors. Vaccinated individuals, in contrast, would not be required to wear a mask indoors but are welcome to still wear a mask if they choose to, so please do not assume that individuals wearing masks are unvaccinated.
2. Instructors and TAs will not ask for proof of vaccination. This, too, may change in response to changing conditions.
3. Please note provisions on masks, vaccines or other possible requirements are subject to change as the situation evolves, based on guidance from the Centers for Disease Control, the State of New Mexico, and university officials (i.e., the President and the Board of Regents).
4. Students should not come to class if they are feeling ill and to follow any quarantine guidelines that they are given in the event of exposure to COVID-19. If you do miss class, please contact the instructor for missed assignments, contact the Student Health Center, and consider getting tested for COVID-19.

For the most up-to-date guidelines, please consult NMT's COVID-19 information page: <https://www.nmt.edu/covid19/>.

Course Learning Outcomes:

By the end of this course, students will learn basic discrete and continuous distributions, perform simple probability calculations, apply Bayes' rule, calculate and interpret mean and variance of a distribution. They will have some understanding of bivariate distributions, regression and correlation/covariance. They will be able to understand and apply descriptive statistics and the basics of inferential statistics (confidence intervals, tests).

Program Learning Outcomes:

Learning objectives for the math departments undergraduate and graduate degree programs can be found at

<https://nmt.edu/academics/math/about.php#slo>

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 for Disability Services (ODS) as soon as possible. They will describe the process by which you can request such accommodations for this course. To schedule an appointment, please call 835-6209, or email disability@nmt.edu.

Counseling Services:

New Mexico Tech offers individual and couples counseling, safety assessments, crisis intervention and consultations through The Counseling Center. These confidential services are provided free of charge by licensed professionals. For more information, please call 835-6619, email counseling@nmt.edu or complete an Intake Form on our website at <https://www.nmt.edu/cds/>. All services are provided via phone or Zoom during the Covid-19 pandemic.

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, 216 Brown Hall, 575-835-5880 (O), 575-322-0001 (C), titleixcoordinator@nmt.edu). Please visit Tech's Title IX Website (www.nmt.edu/titleix) for additional information and resources.