

MTH 422-01

Mathematical Statistics, Elmhurst University
1:00–2:40 Tu Th, Daniels Hall 304, Spring 2024

Course Description: Mathematical theory of statistical inference. Methods of estimation, maximum likelihood estimation, properties of estimators, confidence intervals, hypothesis testing, significance and power, contingency tables, goodness-of-fit. Prerequisite: MTH 421. Spring Term, even-numbered years. Course credit: 1.0. One course credit (1.0) at Elmhurst University is equal to four (4.0) semester hours.

Professor: Dr. A. Rogers, he/him, Daniels Hall 218, allenr@elmhurst.edu

Email: If you email me Sunday through Thursday, I probably will respond by the end of the next calendar day. If you email me on Friday or Saturday, I probably will respond by the end of the following Monday.

Office hours: Online or in-person, send email to make appointment.

Text: Hogg, Tanis, and Zimmerman, Probability and Statistical Inference, 10th ed., ISBN 9780135189399

Using Your Laptop in Class: In class, but not on exams, use whatever technology helps you learn.

Delivery Mode: Our class meets in person every day. I'll email you if there's a change: for example, if we meet remotely because of snow. The delivery mode of this course is subject to change based on county, state or federal guidelines, or on local conditions related to Covid-19.

Names and Pronouns: Feel free to tell me the name you use, including pronunciation, and the pronouns you use. Please correct me if I make a mistake. You can change your first name in Blackboard; this only changes how it displays in Blackboard. Contact the Office of Registration and Records to change your name with the University.

Grading: Letter grades are computed from six components, weighted as follows:

Presentations/Seminar	20%
Exam 1 (Thu, Feb 22)	20%
Exam 2 (Thu, Mar 14)	20%
Exam 3 (Thu, Apr 18)	20%
Final Exam (Tue, May 14, 1:00–3:00)	20%
(the final only covers the last few weeks)	
Total	<hr/> 100%

Grading Scale: A [92, ∞), A- [90,92), B+ [88,90), B [82,88), B- [80,82), C+ [78,80), C [72,78), C- [70,72), D+ [68,70), D [60,68), F ($-\infty$, 60)

Presentations/Seminar: I'll give you a weekly schedule for oral homework problem presentations. The presentation is a step-by-step explanation of how to do a homework problem. On any day during your assigned week, you choose a problem from the current homework assignment, and prepare in advance your presentation to give during our class meeting.

If you miss giving your presentation during your assigned week, you may still do it for full credit during your presentation grace period, which is the week after your assigned week—after that, no credit. The grace period is very lenient to accommodate any issues that may arise. Don't put off doing your presentation.

Math seminars are usually on Wednesdays from 4 to 5. Some may be in person and some may be remote. You are required to attend one of the math seminars, write a one or two page summary paper for the seminar you attend, and submit your paper on Blackboard. The paper is worth the same as two presentations and is due May 14.

Exams and Final Exam: If you miss an exam, you need a good reason for me to excuse you and allow a makeup. You must email me as soon as possible with an explanation, in advance if possible.

Student Learning Outcomes:

1. Evaluate statistical estimators according to criteria such as biasedness and consistency.
2. Perform point estimation of statistical parameters using the method of moments and the method of maximum likelihood.
3. Construct confidence intervals and perform hypotheses tests in one-population and two-population settings.
4. Find the power function and significance level of a hypothesis test.
5. Apply the chi-square statistic to tests for goodness-of-fit, homogeneity, and independence.

Outline of Course Topics:

- Ch 4: Bivariate Distributions of the Continuous Type
- Ch 5: Distributions of Functions of Random Variables
- Ch 6: Point Estimation
- Ch 7: Interval Estimation
- Ch 8: Tests of Statistical Hypotheses
- Ch 9: More Tests

Changes: This syllabus is subject to reasonable change. I'll communicate any changes by email.

Different Instructors Have Different Policies: Among your different classes with different instructors, there will be different policies about absences, due dates, emails, permissible resources, and so on. It is important to reexamine the syllabus for each class from time to time, to remind yourself the requirements and expectations.

Additional Academic Integrity Information for This Course: Intentionally obtaining or attempting to use unauthorized materials or information or unauthorized help from another person is considered cheating. The following comments are illustrative but not exhaustive.

Tests test how well the student has learned. Therefore, unless the professor specifies otherwise, all examinations are to be completed by the student alone, without extraneous assistance of any kind. That means no help is to be given to or received from other persons during the test; no books, notes, calculators, or other materials of any kind are to be consulted; and if a calculator or other hand-held electronic device is permitted to be used for mathematical calculations, no other information may be programmed into or retrieved from the device. Whenever the professor permits an exception to any part of these rules, the exception applies only as far as specified by the professor. Such exceptions must be expressly permitted and cannot be presumed from prior exceptions on other tests. (From *A Student's Guide to Academic Integrity at the University of Oklahoma*, Office of the Senior Vice President and Provost, University of Oklahoma, Norman Campus, <http://web.archive.org/web/20060824175857/http://www.ou.edu/provost/integrity/>, accessed August 23, 2006.)

Mask/Face Covering Policy (2023–2024): Public health is everyone’s responsibility. Following current guidance from the Centers for Disease Control and Prevention and the Illinois Department of Public Health, masks are optional. This policy may change in response to the evolving situation. Our values of community and responsibility require that we treat each other with grace, respect, and civility, whether or not someone chooses to wear a mask.

If you have any symptoms associated with the current COVID-19 variants in circulation (sore throat, cough, congestion, fever, chills, headache, fatigue, loss of taste or smell, etc.) please get a COVID-19 test immediately. Stay home and isolate for five days if the result comes back positive. Do not attend classes in person and alert your instructor you will be isolating. After isolation is complete, follow current CDC guidelines and wear a well-fitting mask around others for an additional five days after the initial isolation period, regardless of vaccination status.

Learning Center: Academic Support: The Learning Center is the place to go for convenient, free access to academic support for all Elmhurst University students. Each tutoring session is designed to help students with coursework while at the same time modeling the strategies and processes needed for individual growth. Additionally, assistance with study groups and learning strategies is available. To find out more, go to elmhurst.edu/LC.

To sign up for peer tutoring, go to My Tutoring, located on the portal. For more information, contact Molly Rentscher, Director of the Learning Center, at molly.rentsch@elmhurst.edu.

Access and Disability Services: Elmhurst University is committed to creating an inclusive learning environment for its diverse student population. If you experience or anticipate any barriers to learning, please notify the instructor as soon as possible. If you are a student with a documented disability and would like accommodations to participate fully in this class, contact Dr. Linda Harrell, ADS Director, at disability.services@elmhurst.edu. For more information, visit elmhurst.edu/ADS. If you previously received accommodations, please remember that they must be renewed each term.

Code of Academic Integrity: Elmhurst University is a community of scholars. Such a community places the highest value on academic honesty and integrity. Therefore, Elmhurst University’s Code of Academic Integrity is designed to ensure:

1. A fair academic environment where students are evaluated on the scholarly merits of their work.
2. An academic environment where personal integrity is fostered.
3. An understanding of standard academic practices when formulating ideas, conducting research, and documenting sources.

There are general campus-wide definitions of academic honesty as well as departmental guidelines, which are articulated in individual course syllabi. Students are responsible for educating themselves on this matter since sanctions for academic dishonesty may be severe. Thus, Elmhurst University students are expected to act honestly in all academic work.

The entire Code of Academic Integrity may be found in the Student Handbook available on the Student Life section elmhurst.edu/student-life of the University website.

Non-Discrimination and Non-Harassment Policy: The University’s Non-Discrimination and Non-Harassment Policy may be found on the University website. elmhurst.edu/TitleIX

Community Standards: The Community Standards may be found in the Elmhurst University Student Handbook available on the University website. elmhurst.edu/student-life

Support Resources and Supporting Fellow Students in Distress: As members of the Elmhurst University community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether in regards to their well-being or your own, we encourage you to refer this behavior to the Director of Student Support Services and Intervention in the Office of Student Affairs through the Student of Concern referral form on the University website at <https://www.elmhurst.edu/student-life/support-services/support-services-intervention/>. Based upon your report, staff in the Office of Student Affairs reach out to students to make sure they have the support they need to be healthy and safe.

Additionally, we want to support you in your overall wellness. We know that students sometimes face challenges that can impact academic performance (examples include mental health concerns, food insecurity, homelessness, personal emergencies). Should you find that you are managing such a challenge and that it is interfering with your coursework, you are encouraged to contact the Director of Student Support Services and Intervention through studentaffairs@elmhurst.edu for support and referrals to campus and/or community resources. For any emergencies, call Public Safety at (630) 617-3000 or call 911.

Statement Regarding Netiquette: The University expects that all students will use appropriate online etiquette (netiquette) while using communication tools such as email, discussion boards, chat applications and otherwise interacting online in courses. Please follow these guidelines when communicating in this course:

- **Be respectful.** Be sensitive to the fact that others will have different cultural backgrounds, linguistic traditions, and different political and religious beliefs.
- **Use correct spelling and grammar.** This is an academic course so proper composition, punctuation and grammar are expected. Avoid using texting shortcuts, acronyms, and informal slang.
- **Use appropriate language, style and tone.** Maintain a fair and objective tone and avoid making disagreements personal. Swearing and profanity should be avoided. Don't use all capital letters as this may be regarded as shouting, impolite or aggressive.
- **Be credible.** Evaluate your sources for credibility. Always cite your sources as appropriate.
- **Proofread before you send.** Remember that electronic communications may outlive the duration of the course. Proofread and review your writing before you post or send.
- **Be forgiving.** In the absence of nonverbal communication misunderstandings are more frequent. If something offends you, work with the instructor regarding the incident rather than engaging in further enflamed discussion.

Elmhurst University Civility Statement: The Elmhurst University Civility Statement has been endorsed by many major bodies on campus (Faculty Council, Academic Council, President's Cabinet, PACoDEI, Student Affairs Council).

In the spirit of our mission, vision, and core values, the Elmhurst University community aspires to co-create and maintain an environment of respect, integrity, courtesy, inclusivity, and human decency. This invites rigorous and respectful debate in which individuals are encouraged to participate in honest and open civil discourse. Honoring a tradition of social justice, Elmhurst University fosters a diverse, positive, and inclusive culture where members change and grow as they encounter new people and ideas.

Sexual Harassment and Retaliation: As an employee of Elmhurst University, I am a Mandated Reporter of sexual harassment and retaliation that occurs toward students. This means that if I receive notice of or specific information about an incident of sexual harassment, sexual assault, dating or domestic violence, stalking, or retaliation, I am obligated to share this with the University's Title IX Coordinator. This report to the Title IX Coordinator will enable the University to take appropriate action to ensure the safety of and to offer appropriate resources to those involved. For students not wishing to make an official report, confidential reporting options are available. Please see the University's Title IX webpage <https://www.elmhurst.edu/about/policies-consumer-information/title-ix/> for more resources or to file a report.
