

MA109: Introduction to Probability and Statistics

Course Instructor: Andrew Middler

Winter 2021

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Office Hours: TBD

Office: Zoom

Web: educat.nmu.edu

Class Hours: MTWR 8-8:50am

Class Room: Zoom

Course Objectives

This class assumes no prior instruction of probability or statistics, or a working knowledge of R programming, and serves to achieve the following outcomes:

1. Read, use, and interpret correct vocabularies of probability and statistics.
2. Apply basic principles of data collection to observational study and experimental design. This may include (but is not limited to) topics such as randomness, sampling error, sampling techniques, bias, blinding, and types of data.
3. Summarize, present, and interpret data graphically and numerically. This may include (but are not limited to): frequency distributions, pie charts, boxplots, stem plots, histogram, measures of central tendency, and measures of dispersions.
4. Perform basic probability computations. These include (but are not limited to): the addition rule, the multiplication rule for independent events, and the complement rule.
5. Solve problems by applying appropriate probability distributions, which may include (but are not limited to) discrete, binomial, and normal probability distributions.
6. Use the Central Limit Theorem to model sampling distributions and compute probabilities based on sampling distributions.
7. Construct and interpret confidence intervals of proportion or mean for one population.
8. Construct and interpret confidence intervals for the difference of proportions or means for two populations.
9. Formulate and test hypotheses about parameters for both one and two populations for both n means and proportions

10. Analyze bivariate data. This includes (but is not limited to) generating and interpreting scatter plots, line of best fit or ANOVA as appropriate, and the related r and r^2 values.
11. Interpret and apply output from a statistical software package, such as R.

Course Materials

This course will be utilizing the Sapling/Achieve website provided by Macmillan for online homework and other supplementary learning materials. When you go to www.saplinglearning.com, you will need to make a US Higher Ed account, and select the *Northern Michigan University - MA 109 - Winter21 - Middler* course. In order to access the course, as well as the accompanying online textbook (Basic Practice of Statistics, 8th Edition by Moore), you'll need to either directly pay Macmillan at the course page, or purchase a code from the bookstore, and apply it when you select the course. Additionally, you must download the CamScanner app on your phone (the free version from Adobe works, you don't have to pay, and please don't use one of the bootleg versions on the app store) so you can scan and submit your work. (A regular scanner works as well.)

You will also need to download the statistical software you will be using to do your homework. First, go to cran.r-project.org and download and install R. Think of it as the engine providing all the horsepower for your calculations. The steering wheel and pedals that you will directly use are in RStudio, which is the program we will be doing much of our work in. That can be downloaded at <https://rstudio.com/products/rstudio/>, where you'll want to download the free version of RStudio Desktop and install it.

Online Homework

Online homework for this class will be comprised of standard homework assignments on Sapling, as well as LearningCurve assignments in Sapling. Homework will be due on Fridays, with the material in the homework being covered in class that week. By having the homework due on Fridays, this allows you to get help in office hours, the Math Lab, and in class in the days leading up to the homework being due. Homeworks will be made available in the weeks prior to them being due to allow you to work ahead, should you elect to.

Grading Policy

Overall course grade will be computed as follows:

90 - 100%	A
80 - 89%	B
70 - 79%	C
60 - 69%	D
0 - 59%	F

That grade will count the assessments using the following proportions:

Final	30%
4 Exams	40%
Homework	20%
Quizzes	5%
Participation	5%

Suggestions

Math is a team sport, and I look forward to being a part of your team to help you be successful in this course. In addition to my office hours, the University has established tutoring services that are free-of-charge to NMU students, and I highly encourage you to take advantage of both the Math Department's Math Lab in Jamrich 2100 (which is now offering extended weekday hours as a result of the pandemic), as well as NMU's All-Campus Tutoring in Harden Hall and the Woods.

At the same time, learning is an active process, and it is critical that you respect this process. Attending every class, being mentally present in those classes, and engaging yourself in the activities we do in class will have a tremendous influence on your success. Work with your classmates, and your peers at the tutoring centers, to grow your skills as you struggle with concepts and problems, make mistakes, and *then* find the solution. There is a direct relationship with effort and academic success, and I want you to know what resources (and I am one of those resources!) are at your disposal to help you translate your effort into the grade you want, given requisite effort.

Accessibility

If you have a need for disability-related accommodations or services, please inform the Coordinator of Disability Services in the Dean of Students Office at 2001 C. B. Hedgcock Building (906-227-1737 or disserv@nmu.edu). Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state, and University guidelines.

Note on Flexibility

I won't pretend that this will be a "normal" semester, and neither should you. There are a number of challenges that we will likely face, as both a class and a university, over the course of the semester, the worst of which will be out of our hands. What we can control, and what I plan to try and control, is our response to those challenges.

Personally, it is my view that my job is to help you learn the content of the course. I feel that this includes navigating these challenges we're likely to face. Those challenges will likely include students getting sick with Covid-19, and temporary "shifts to online" from the university. These are not typically part of the college experience. However, the online elements of this course have been designed to mitigate the day-to-day shifting between online and in-person you may go through in your other courses, and should remain relatively unchanged through the semester.

- Homework: All homework for this course is online. The typical homework assignments are taken care of by the Macmillan portal, and supplementary (review) assignments can be completed at home before being scanned and submitted on EduCat.
- Exams: All exams will be online through EduCat.
- Attendance: All class lectures will be given via Zoom at the allotted class time, 8 to 8:50 AM ET. Your attendance is required, but slides are made available ahead of time, with updates after lecture.

Final Disclaimer

I reserve the right to alter the policies and contents of this syllabus upon adequate notification of you, the student.