

MA109
INTRODUCTION TO
PROBABILITY AND STATISTICS

Fall 2020

MA109 SYLLABUS

Instructor

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Prerequisite

- ▶ A C- or better from MA100 or Recommendation from NMU Math Placement

Office Hours

- ▶ Office hours will normally be through Zoom and in person: New Jamrich 2208, MWRF 11 am – 11:50 am

MA109 SYLLABUS

Computer and Calculator Requirements

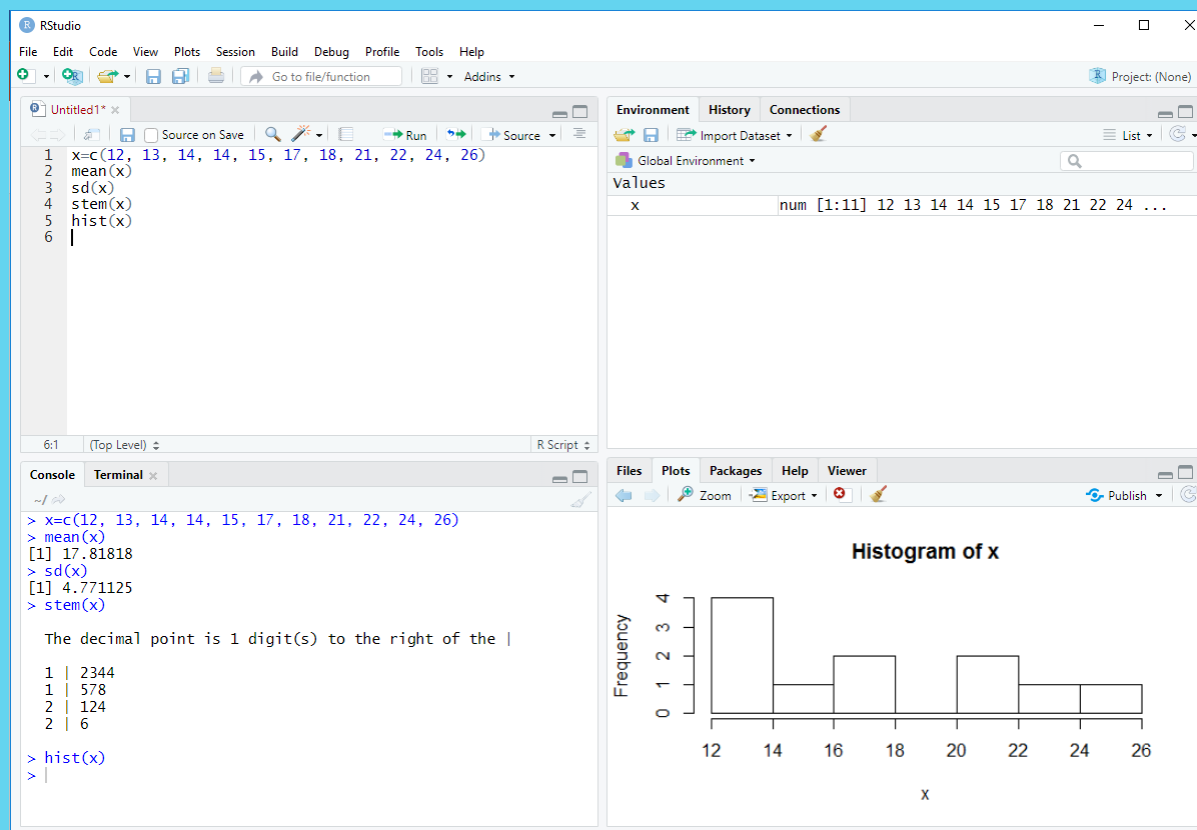
- ▶ A computer with R and R-studio (free industrial quality software) installed.
- ▶ Internet and Sapling Access for homework assignments.
- ▶ A scientific calculator (or a similar app) is needed for day-to-day work.

Software used in this class

- ▶ R and R-Studio (throughout the semester, **mandatory**).
- ▶ A few online applets/calculators will be used in specific chapters.

R and R-Studio

- ▶ We will be using R/R-Studio **on a daily basis**. Using R is not only as a tool replacing tables, the basic use of R for statistical calculations is part of the curriculum.
- ▶ Learning of R is a progressive process throughout the semester.




The screenshot displays the RStudio interface with the following components:

- Source Editor:** Contains R code for creating a vector `x` and performing statistical operations: `x=c(12, 13, 14, 14, 15, 17, 18, 21, 22, 24, 26)`, `mean(x)`, `sd(x)`, `stem(x)`, and `hist(x)`.
- Environment:** Shows the variable `x` as a numeric vector of length 11.
- Console:** Displays the execution results: `mean(x)` returns `[1] 17.81818`, `sd(x)` returns `[1] 4.771125`, and `stem(x)` shows a stem plot with values 2344, 578, 124, and 6.
- Plots:** A histogram titled "Histogram of x" is shown, with the x-axis labeled "x" and the y-axis labeled "Frequency". The histogram bars represent the frequency of each value in the vector `x`.

Value	Frequency
12	4
13	1
14	2
15	1
17	2
18	1
21	1
22	1
24	1
26	0

Text Book

- ▶ The required text for the course is an online access code – SaplingPlus for the Basic Practice of Statistics 8th Ed.

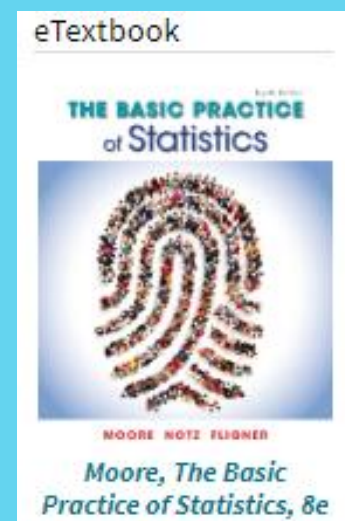


ISBN 9781319213237
SaplingPlus for the Basic Practice of Statistics 8th

Formats: New, Used, Rent

Author: [David S. Moore](#) ; [William I. Notz](#); [Michael A. Fligner](#)
Publisher: [Freeman & Company, W. H.](#)
Edition: 8th, Eighth, 8e **Year:** 2018 **Format:** Digital, Other
ISBN 13: 9781319213237 (978-1-319-21323-7)
ISBN: 1319213235 (1-319-21323-5)
More Editions: [Hardcover](#), [Hardcover w/ access code](#), [Hardcover w/ CD](#), [Access code](#)

- ▶ An interactive e-textbook is in the system.
- ▶ The access also contains the online homework system. Your completed online homework assignments will be graded and recorded. (Setting up Sapling instructions are at the end of this syllabus)



Lecture Format and Classroom Seating

- ▶ The class is delivered as a face-to-face class where all lectures will be conducted in the classroom, and will be Zoom broadcasted for those who are not able to attend the class in person.
- ▶ Students need to keep the same seating throughout the semester whenever in the classroom.
- ▶ Students are expected to attend the classes either in the classroom or through Zoom and are encouraged to ask questions during classes in person or through Zoom.

Homework, Tests and Quizzes

- ▶ Online Homework Assignments on SaplingPlus are given for each chapter. Completed homework assignments are graded and computed into grades.
- ▶ 5 Biweekly Quizzes (drop one lowest quiz). The quizzes will be given on Thursdays or Mondays (alternating). (Makeups are allowed if notified on time.)
- ▶ One Midterm
- ▶ One final exam, check with the NMU websites for final exam schedules.

Online Homework Assignments

- ▶ Students can attempt homework assignment problems multiple times (with a slightly discounted credit each time).
- ▶ Homework assignments have due dates normally about two weeks after the assigned date. After the due dates, attempts are not allowed but still visible. Students can ask for due date extensions under special circumstances.
- ▶ Each chapter has a homework assignment consisting of usually no more than 20 problems. Each assignment is worth 100 points.
- ▶ You can use R/R-Studio for all of the homework assignments and quizzes.

Quizzes and Tests

- ▶ Completing and familiarizing with the homework problems and examples on slides are the best ways to prepare for quizzes.
- ▶ Quizzes are formulated to reflect on your understanding the concepts discussed in classes and you work in homework assignments.
- ▶ All tests and quizzes will all be online through Educat.

▶ A Sample Online Homework Session

The screenshot shows the Sapling Learning interface for a homework session. The top navigation bar includes the Sapling Learning logo and the course title "Chapter 4 Homework". The breadcrumb trail indicates the current location: "Sapling Learning > Northern Michigan University - MA 109 (Sections 1, 2, 5) - Fall19 - ZHANG > Activities and Due Dates > Chapter 4 Homework".

On the left side, a sidebar displays a list of 20 questions, each with a score of 0/100 and 0 of ∞ Attempts. The current question, Question 20 of 20, is highlighted.

The main content area shows the question details. At the top, it displays "Assignment Score: 0/2000". Below this, the question title "Question 20 of 20" is shown. The question content includes a table of data and a text prompt.

Lake	1.8	12.9	Wayne	1.0
Licking	4.0	13.2	Wood	1.0

To access the complete data set, click the link for your preferred software for

[Excel](#) [Minitab](#) [JMP](#) [SPSS](#) [TI R](#) [Mac-TXT](#) [PC-TXT](#) [CSV](#) [CrunchIt!](#)

(a) Using the software of your choice make a scatterplot of the data. What is the correlation coefficient r (round to 2 decimal places.)

$r =$

(b) Using the software of your choice make a scatterplot of the data with one additional point (Point A) where the suicide rate is 30. Find the new correlation for the original data plus Point A. (round to 2 decimal places.)

Grading (Weighted average)

- ▶ Online homework assignments 29%
- ▶ Quizzes and Projects 40%
- ▶ Midterm 15%
- ▶ Final Exam 15%
- ▶ Attendance 1%

The grade is given based on the weighted average:

Percent Greater or Equal	95	90	85	80	75	70	65	60	55	50	45	-
Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

► Liberal Studies Requirement

This course satisfies the Formal Communication Studies requirement.

This course is designed to introduce students to the ways in which information and ideas are expressed using a communication system other than English. Such courses should foster the student's ability to conceptualize and communicate in an orderly, rational manner.

Characteristics of a communication system include: 1) possession of a grammar; 2) operation from an established set of rules; 3) reasoning properties such as deduction, inference drawing and problem solving. This includes courses in languages and those in which the central focus of the course is on statistics, computers or formal logic.

DISABILITY SERVICES

- ▶ 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 (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.
- ▶ Certain students may qualify for alternative face-covering accommodations due to a variety of health conditions. These students have gone through a qualifying process with the Office of Disability Services. Faculty have been notified of which students receive these accommodations in their class. If you have concerns regarding this topic please contact the faculty member outside of class. Please do not question or confront fellow students in the classroom who are using alternative or modified face coverings.

INSTALLATION OF R AND R-STUDIO

▶ To Install R:

- Open an Internet browser and go to www.r-project.org.
- Click the "download R" link in the middle of the page under "Getting Started."
- Select a CRAN location (a mirror site) and click the corresponding link such as <https://repo.miserver.it.umich.edu/cran/> or any other site.
- Click on the "Download R for Windows" or "Download R for (Mac) OS X" link.
- Click on the "install R for the first time" link at the top of the page (Mac users read message therein).
- Click "Download R 4.0.2 for Windows" and save the executable file somewhere on your computer. Run the .exe file and follow the installation instructions.
- Now that R is installed, you need to download and install RStudio.



▶ To Install RStudio

- Go to www.rstudio.com and click on the "DOWNLOAD" tab on the upper right screen.
- Click on "DOWNLOAD" under "RStudio Desktop (Free)".
- Click on the version recommended for your system, or the latest Windows version, and save the executable file. Run the .exe file and follow the installation instructions.



SETTING UP SAPLINGPLUS SYSTEM

- ▶ Go to www.saplinglearning.com/login to create an account. If you already have a Macmillan Learning account you can log in with your existing credentials and skip to step 3.
 - Create your password and set all three security questions.
 - Start typing in your institution to select from the options that appears in the Primary Institution or School name field. If you institution does not appear you can add it by typing in the full name.
 - Accept the terms of use and click “Sign Up”.
 - Check your email for the confirmation link to complete your registration and return to the login page.
- ▶ Set your institution by searching using your institution's full name and selecting the appropriate option from the menu that appears.
- ▶ Under Enroll in a new course, you should see Courses at Northern Michigan University. Click to expand this list and see courses arranged by subject. Click on 'Introduction to Statistics' to see the terms that courses are available.
- ▶ Click on the term to expand the menu further.
- ▶ Once the menus are expanded, you'll see a link to our course: **MA 109 – Fall20 - ZHANG**
- ▶ Enter the key code for your section:
 - Section 1 (10am class, 81555): **zhang1**
 - Section 2 (9am class, 81556): **zhang2**
 - Section 5 (8am class, 81557): **zhang5**
- ▶ To access your eBook, click on the image of the cover on the right sidebar of your course site. Create an account or log in with an existing Macmillan Learning eBook account.
- ▶ **Need Help?** Answers to many common questions are found in our Student Support Community. If you need direct assistance you can also contact technical support: <https://macmillan.force.com/macmillanlearning/s/>.

STATISTICS

Statistics is a discipline which is concerned with:

- ▶ designing **experiments** and **data** collection.
- ▶ summarizing information to aid understanding.
- ▶ drawing **conclusions** (inference) from data.
- ▶ estimating unknown or future values the **futures**.

COURSE CONTENTS

- ▶ Part I Exploring Data
Chapter 1 - Chapter 6
- ▶ Part II Producing Data
Chapter 8 - Chapter 9
- ▶ Part III From Data Production to Inference
Chapter 12 – Chapter 18
- ▶ Part IV Inference About Variables
Chapter 20 – Chapter 21
- ▶ Part V Inference About Relationships
Chapter 25 – Chapter 27

LEARNING OBJECTIVES

The emphases of the course is on the concepts of statistics. Students are not required to memorize many formulas.

- ▶ Learn the fundamental set of concepts and vocabularies in probability and statistics
- ▶ Understand the nature of statistics and why the statistics as a mathematics subject can help with decision makings
- ▶ Learn the concepts of central tendencies and variations and their applications
- ▶ Gain a comprehensive knowledge about the definition and calculations of probabilities, odds, counting principles
- ▶ Learn the concepts of positions such as percentiles and their use in applications
- ▶ Learn the statistical methodologies for estimating population parameters such as confidence intervals and hypothesis tests.
- ▶ Learn the fundamental syntax of a statistical programming language such as R.

Note:

The course materials such as slides will be put on educat.nmu.edu

Online homework assignments will be on saplinglearning.com