Course Description

This course offers an introduction to statistics for economics and business students. This course covers descriptive and inferential statistics with special attention on the critical consumption of statistics in the media and responsible deployment of statistics in research. The course emphasizes comprehension, application, and communication of research findings.

Course objectives

At the completion of this course, students will be able to

- validate assumptions of bivariate and multivariate regression models.

- use discrete and continuous probability distribution functions to calculate the expected value and variance of a random variable, as well as the probability of observing particular outcomes of random variables.

- use confidence intervals and hypothesis tests to make inferences about population means and proportions.

- explain the concepts of randomness, probability, random variables, and sampling distributions.

- illustrate the difference between the Central Limit Theorem and the Law of Large Numbers as demonstrated by SAS simulations using artificial data.

- explain the concepts of bivariate and multivariate regression.

- design a statistical study to answer an empirical research question.
• create graphical and numerical summaries of economic data using Excel and SAS and interpret the results.

• formulate bivariate and multivariate OLS regression models and fit the models to empirical data using SAS.

• calculate measures of central tendency, dispersion, distributional shape, and association between two variables, and interpret the results.

• calculate conditional, joint, and marginal probabilities and use them to analyze the likelihood that an event will occur.

• calculate conditional, joint, and marginal probabilities and use them to analyze the likelihood that an event will occur.

**Required materials**

- Making Sense of Data Through Statistics 2nd Ed, Nevo

  A pdf version of this text is available online at www.ldpress.com for $19.95

- Additional readings, assignments, and lecture slides will be made available in Blackboard

**Course Structure**

**Overview of expectations, assignments, and exams**

We’ll cover a chapter of Nevo (Second Edition) in addition to a variety of assigned readings (posted on Blackboard) each week. Your classmates and I expect you to come to class prepared, meaning that you will have read the week’s assigned readings in advance of our class meeting on Tuesday each week.

We’ll have two exams and series problem sets over the course of the semester. In addition, you will work towards a data-based research paper over the course of the semester on a topic that is of interest to you. Finally, pop quizzes may appear without notice; these will be used to assist me in assessing your preparation for and comprehension of course material.

Consultation and collaboration with your peers is encouraged for the completion of problem sets (with the cautionary note that free riders will pay a serious penalty on quizzes, exams, and the final research paper); however, the final research paper must be uniquely yours with proper attribution of all sources.

**Research paper**

You will work towards a research paper in this course by meeting several milestones over the course of the semester. The milestone dates and the extent to which these milestones contribute to your grade on this assignment are listed below; the dates are also included in the schedule below.
• Research question and data set (10%), due September 20
• Brief literature review (10%), due October 4
• Summary statistics and methods (10%), due November 1
• Analysis and discussion of findings (10%), due November 15
• Visit to the writing center (5%), due between November 27 and December 6
• Final draft (55%), due December 7

Optional training sessions
I will hold three optional training sessions outside of regular class hours to assist those who are interested in become more proficient in Excel and SAS. In addition, for students who are interested in collecting data from a social media platform, the Economics Liaison Librarian, William Crowell, will offer a tutorial on simple web-scraping. The times and dates for these optional training sessions are subject to change, depending on student availability (which will be assessed on the second day of class):

• Excel training Wednesday September 5, 4:30-5:30pm
• SAS training Thursday September 6, 4-5pm
• Training on web-scraping Thursday September 13, 4-6pm

More (or fewer) sessions may be offered depending on student interest and availability.

Discussion board
We’ll use a discussion board approach to trouble shooting your problem sets. You’ll find the discussion board under course tools on Blackboard. I will create a forum for each problem set once it is distributed; feel free to add threads for your specific questions. Like a “leave a penny, take a penny” jar, the success of this forum will fully depend on your contribution. If everyone is only posing questions and no one is answering questions, then the forum will fail. If you go to the forum to ask a question, take time to look as your classmates’ questions and see if you can help. Your participation grade will be based on how well you assist your peers’ learning in class and/or in this forum.

The discussion board approach to troubleshooting problem sets mirrors how many statisticians, econometricians, data scientists, and programmers troubleshoot problems IRL. See for example, StackExchange. Note that such forums have codes of conduct based on kindness and clarity of communication. Visit the StackExchange Code of Conduct for guidance; failure to follow this code of conduct will result in a zero for your participation grade.
Grading

Your course grade will be a weighted average of the following aspects of the course:

- Participation (in class and in problem set discussion boards) 5%
- Problem sets and pop quizzes 30%
- Midterm 20%
- Final 20%
- Research paper 25%

Letter grades will be assigned according to your weighted average for the course.

<table>
<thead>
<tr>
<th>Average Grade</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>87-89%</td>
<td>B+</td>
</tr>
<tr>
<td>77-79%</td>
<td>C+</td>
</tr>
<tr>
<td>67-69%</td>
<td>D+</td>
</tr>
<tr>
<td>93-100%</td>
<td>A</td>
</tr>
<tr>
<td>83-86%</td>
<td>B</td>
</tr>
<tr>
<td>73-76%</td>
<td>C</td>
</tr>
<tr>
<td>63-66%</td>
<td>D</td>
</tr>
<tr>
<td>90-92%</td>
<td>A-</td>
</tr>
<tr>
<td>80-82%</td>
<td>B-</td>
</tr>
<tr>
<td>70-72%</td>
<td>C-</td>
</tr>
<tr>
<td>0 - 62%</td>
<td>F</td>
</tr>
</tbody>
</table>

Late assignments

I will accept late problem sets without penalty so long as a new due date was arranged in communication with me 48 hours in advance of the original due date. Problem sets submitted after the due date without prior communication will receive a grade of zero.

Because the research paper milestones build on one another, and because I will have a tight turn around time during which to provide you with feedback before the next milestone, late submissions of these assignments will receive a zero.

Emergencies and other extenuating circumstances affecting your ability to turn in your work on time will be considered on a case-by-case basis. Overall, communication with me in advance of the due date will be rewarded while lack of communication is likely to result in a zero.

Attendance

Your regular attendance in class is expected. If you anticipate a conflict with an exam or an assignment due date, you must reach out to me as soon as possible but no later than 48 hours prior to the exam or due date to make alternative arrangements. Should you be absent for an exam or an assignment due date without having made prior arrangements, you will receive a zero for the exam or assignment.

As with late assignments, emergencies and other extenuating circumstances affecting your ability to attend class will be considered on a case-by-case basis. Overall, communication with me in advance will be rewarded while lack of communication is likely to result in a zero.
Academic integrity and honesty

Students are required to comply with the Code of Student Conduct; this includes proper attribution of all sourced materials.

Institutional Policies and Resources

Academic accessibility

SMCM is committed to providing access to the educational experience to students with disabilities and health conditions that impact learning. If you have received a letter from the Office of Student Support Services (OS3), which outlines the academic accommodations to which you are entitled, you MUST meet with me to review that letter and discuss how your learning needs intersect with the course expectations. If you suspect that you have a learning need that could benefit from academic accommodations, you should contact the Office of Student Support Services, who can help you learn more about how to proceed in this instance as well.

Title IX and sexual misconduct

As stated in the St. Mary’s Way, the College is a place where we strive to foster relationships based upon mutual respect, honesty, integrity, and trust. As such, we are committed to providing an educational, living, and working environment free from all forms of harassment and discrimination for all members of our community. The College prohibits all forms of sexual or gender-based harassment, discrimination or misconduct, including sexual assault, sexual harassment, relationship violence, and stalking.

If you or someone you know has experienced sexual misconduct, you may find information about resources and options on the Campus Rights webpage (www.smcm.edu/campus-rights) or by contacting the College’s Title IX Coordinator, Michael Dunn (mkdunn@smcm.edu or 240-895-4105).

Under College policy, faculty members are required to share any reports of sexual misconduct with Michael in order to make sure that the College is responding appropriately to address the health and safety needs of members of our community.

On-campus confidential resources are available, including the counselors at the Wellness Center (240-895-4289) and the Sexual Misconduct Advocacy and Resource Team student-run 24/7 hotline (301-904-2015). More information about on- and off-campus confidential resources, as well as medical treatment, law enforcement, and other support services, may be found on the Campus Rights webpage.

The Writing and Speaking Center

The Writing and Speaking Center, located in the Library Annex, offers free consultations in writing and speaking for students at all levels and in all disciplines. No matter what you’re writing and no matter where you are in the process (generating ideas, drafting, revising or
proofreading), the peer tutors in the Center can assist you. These tutors are friendly students and also strong writers with special training as writing and speaking consultants. They will not grade or correct your papers; instead, they will coach you and help you to become a better writer. Similarly, the tutors are trained to help you plan and practice presentations and other speaking assignments. I encourage you to use the Writing and Speaking Center as much as possible. You can make a one-time or repeating appointment with the Center by visiting their website, www.smcm.edu/writingcenter, and clicking "Schedule an Appointment." At the same website, you can find helpful resources on many writing-related topics.
General Schedule

Please note that this schedule is tentative and subject to change as the semester progresses. Exam dates and important due dates for the research paper are noted in bold. Problem sets will be given on, at most, a weekly basis (they will generally be distributed on a Thursday and due the following Thursday).

Week 01, 08/27 - 08/31: Introduction to data, statistics, & data visualization
- Read Nevo Chapter 1, Units 1, 2, and 4
- Read Nevo Chapter 2

Week 02, 09/03 - 09/07: Measures of centrality & variation
- Read Nevo Chapter 1, Unit 3
- Read Nevo Chapter 3
- Read Strogatz "Friends you can count on"

Week 03, 09/10 - 09/14: Probability
- Read Nevo Chapter 4
- Read Strogatz "Chances are"

Week 04, 09/17 - 09/21: Discrete probability distributions
- Read Nevo Chapter 5
- Due Thursday, September 20 Research question and data set

Week 05, 09/24 - 09/28: Continuous probability distributions
- Read Nevo Chapter 6
- Read Strogatz "The new normal"

Week 06, 10/01 - 10/05: Introduction to hypothesis testing & review
- Read Nevo Chapter 7
- Read Caldwell "Four fundamental concepts"
- Due Thursday, October 4 Literature review

Week 07, 10/08 - 10/12: Midterm
- Note No class Tuesday, October 9
- Midterm Thursday, October 11
Week 08, 10/15 - 10/19: Hypothesis testing II
  • Read Nevo Chapter 8

Week 09, 10/22 - 10/26: Hypothesis testing III
  • Read Nevo Chapter 9

Week 10, 10/29 - 11/02: Hypothesis testing IV
  • Note No class Tuesday, October 30
  • Read Nevo Chapter 10
  • Due Thursday November 1 Summary statistics & plan for analysis

Week 11, 11/05 - 11/09: Chi square tests
  • Read Nevo Chapter 11

Week 12, 11/12 - 11/16: ANOVA
  • Read Nevo Chapter 12
  • Due Thursday November 15 Analysis & discussion of findings
  • Due Thursday November 15 Make an appointment to visit the Writing Center before December 6

Week 13, 11/19 - 11/23: Regression
  • Read Nevo Chapter 13
  • Note Class will be held Tuesday, November 20th (Thanksgiving break begins at 10pm)

Week 14, 11/26 - 11/30: Regression II & review
  • Read Wooldridge "The nature of econometrics and economic data"
  • Read Wooldridge "The simple regression model"

Week 15, 12/03 - 12/07: Econometrics & predictive analytics
  • Read Angrist & Pischke "The experimental ideal"
  • Read Kleinberg et al 2015 AER
  • Due Thursday, December 7 Final draft research paper

Week 16, 12/10 - 12/14: Final
  • Final Wednesday, December 12, 9-11:15am