Statistics and Quantitative Methods (MBA 611)

Spring 2026 Syllabus

Sections 800/801: Asynchronous Online; dedicated student hour 8:00 - 9:00 pm ET on Tuesdays

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Professor: Dr. Paul Niekamp
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Office Phone: 765-285-5187
Office Hours: Tuesday & Wednesday 11:00 am – 2:00 pm, and by appointment

Please contact me by Canvas Inbox or traditional email. Emails should conform to proper email etiquette (see link here). I check my email on weekdays and try to respond within 24 hours. I make no guarantees about responding to emails sent late at night or on weekends.

Course Description:
This course is on the use of statistics and quantitative methods for making business and operation management decisions. The topics include applications of probability, hypothesis testing, analysis of variance, correlation, advanced regression, time series analysis and forecasting, linear programming, and simulation.

Prerequisite:
ECON 221 or equivalent; ISOM 551; full admission to a graduate program in the Miller College of Business or by permission of the Miller College of Business director of graduate programs.

Course Objectives
This course provides key knowledge on statistics and quantitative methods for business decisions. From this course, the students will be able to make informed decisions based on sound judgment and analytical reasoning. Accordingly, the students will be expected to support their decisions based on statistical and quantitative foundations.

Course Rationale
Business decisions are mostly based on the information collected from the real world. MBA graduates should be able to identify business problems, build models, and analyze the data based on statistics and quantitative methods. Using these statistics and quantitative tools, the students can interpret data correctly and make sound management decisions.

Required Course materials:

1. *Essentials of Modern Business Statistics With Microsoft Excel*, by Anderson, Sweeney, and Williams, Cengage Learning. You do **not** need MindTap/Aplia/XLSTAT access. If you already have Cengage Unlimited for another class then you may be able to access the ebook through Cengage for free. You can use the 6th, 7th, or 8th edition of the textbook (whichever is cheapest).

2. *Forecasting: Principles and Practice*, 3rd Edition, by Rob J Hyndman and George Athanasopoulos. This textbook is open source and is available for free at https://otexts.com/fpp3/.

3. *Microsoft Excel*. Microsoft Excel is widely available and heavily used by firms, nonprofits, and government agencies. While Apple, Google Sheets, and LibreOffice spreadsheet programs have similar capabilities, some differences in formulas and capabilities may cause confusion. If you do not already have it, Excel is free to download for BSU students.

4. *Posit Cloud; R/RStudio are optional.* R and RStudio are free and I will explain how to install these programs on Canvas. R will be used to conduct statistical analysis that is too sophisticated for Excel. Moreover, R is a coding-based program that makes it easier to organize project workflow to reduce the probability of human error materially impacting results. Students will use the student version of Posit Cloud to follow along with data demonstrations. Students must pay $5/month for Posit Cloud Student but do not need to start doing this until around Week 5 (I will release details in Canvas as that time arrives).

Canvas:
I will use Canvas to share video lectures, problem sets, datasets, supplementary readings, projects, and announcements.

Supplemental Online Material:
This course is a three-credit hour asynchronous online course. For students who appreciate real-time interaction with faculty and other students, there is an optional dedicated student hour each week that will be held via Zoom (recordings will be uploaded to Canvas). See the home page of Canvas for the Zoom link.

Laptop/Computer Policy:
Application is heavily emphasized so that you can efficiently implement statistical analysis in the workplace. During most video lectures, I will analyze data using an Excel or R demonstration file and students should follow along. It may be helpful to watch the video lecture on one screen so that you can conduct Excel analysis on another screen but one screen is perfectly passable if you only have one device and/or monitor. Your computer must have a webcam and microphone.

Determination of Grade in Course
Your grade will be based on a weighted average of the components below.

A	94%-100%
A-	90%-93.9%
B+	87%-89.9%
B	84%-86.9%
B-	80%-83.9%
C+	77%-79.9%
C	74%-76.9%
C-	70%-73.9%
D+	67%-69.9%
D	64%-66.9%
D-	60%-63.9%
F	<60%

Grade Policies
1) Grades are available on Canvas.
2) For any grading issue or grade appeal, notify me within seven days after the grade is posted on Canvas.

Grade Components:

Participation:	30%
Two Group Problem Sets:	20%
Two Individual Problem Sets:	20%
Group Final Project & Presentation:	30%

Participation

- MBA 611 is a course that emphasizes the application of statistical methods and modeling. Many weekly modules will include discussion prompts that are related to current events or common issues in quantitative modeling. Students will discuss statistics, methods, assumptions, and data issues via discussions on Canvas. Posts will be graded based on logic, thoroughness, nuance, and correctness. Some weekly participation deliverables will entail quantitative analysis or coding-based applications.
- Working along with my Excel/R demonstrations will help you in learning the material and debugging code. However, I understand that MBA students commonly juggle multiple responsibilities (work, family, travel, etc.) and attending the synchronous dedicated student hour is not required.

Problem Sets

- Problem sets contain questions to be answered using Microsoft Excel or R (Posit Cloud). If you miss the deadline for a problem set, you may submit up to 24 hours after the due date-time for half credit.
- To aid in the learning process and expand your networks, problem sets 1 and 2 are group-based and each group will turn in *one* Excel workbook or R file. Students will evaluate the contribution of all members in their group. Group-level aggregate statistics will be used to adjust your individual grade from your group's baseline grade. Problem sets 3 and 4 are individual.
- Extension requests due to verifiable extenuating circumstances must be made prior to the deadline.

Final Project & Presentation

- The goal of the group final project is for students to put quantitative knowledge into practice with a real-world application and effectively communicate results. Data used in the project may be cross-sectional, time-series, or panel. Presentations will include data visualizations, descriptive statistics, and one or more of the following quantitative applications: regression analysis (for prediction, causal inference, or associations), simulation methods, forecasting methods. In addition to the presentation slide deck, groups must submit the code and data used in the project so that I can replicate analysis. *Emphasis will be placed on the organization of workflow in an effort to reduce the probability of human error materially impacting results.* We will finish the semester with a week of presentations. Each group will present their work via Zoom. The final project encapsulates most of the material covered throughout the semester and serves as an authentic assessment that takes the place of a final exam. Therefore, groups will present during finals week. *Explicit final project details, the grading rubric, and slide deck examples from past students are available on Canvas.*

Keys to Success:

- Start problem set assignments early so that you can ask for help.
- If you are struggling with course material, seek out help sooner rather than later! Statistics material builds on itself, so material is naturally cumulative.
- Get comfortable with Microsoft Excel. It's a user-friendly program and is rather intuitive. Approach R tutorials proactively to build proficiency through consistent incremental practice and application. R is more powerful than Excel, but it has a steeper learning curve.

Methods of Communication

- I will primarily use Canvas Inbox and Canvas Announcements to communicate deadlines and other material with you.

Frequency of Communication

- I will send a weekly email/announcement with details pertaining to coursework and assignments for the week.

University Statement
We are committed to ensuring that all members of the community are welcome, through valuing the various experiences and worldviews represented at Ball State and among those we serve. We promote a culture of respect and civil discourse.

Disability Statement
If you need course adaptations or accommodations because of a disability, please contact the instructor of record as soon as possible. Ball State's Disability Services Office coordinates services for students with disabilities; documentation of a disability needs to be on file in that office before any accommodations can be provided. Disability Services can be contacted at 765-285-5293 or dsd@bsu.edu.

Freedom of Expression
In this course, we are committed to fostering a learning environment that values intellectual diversity, encourages free expression, and promotes open inquiry. As members of the Ball State Community, we treat each person in the Ball State community with civility, courtesy, compassion, and dignity and respect and learn from differences in people, ideas, and opinions. Please review Ball State University's Statement on Freedom of Expression, the resources on Ball State's Freedom of Expression webpage, and Ball State's Beneficence Pledge.

Attendance Policy
This is an asynchronous online course featuring an optional weekly synchronous student hour that is recorded and uploaded to Canvas for later viewing. Students demonstrate attendance by submitting weekly deliverables by the posted deadlines. Consistent with professional standards, proactive communication is required to request extensions for extenuating circumstances. Synchronous attendance is mandatory for final project presentations at the end of the semester.

Academic Integrity
As students of the university you must conduct yourself in accordance with the highest standards of academic honesty and integrity. Academic dishonesty includes any type of cheating or plagiarism, both inadvertent and intentional. Academic dishonesty by a student will not be tolerated and will be treated in accordance with the BSU Student Academic Ethics Policy. An ethics violation, depending on the severity, can lead to a zero for the assignment, failure of the course, or expulsion from BSU. Per University policy, all ethics violations, even if resolved at the instructor level, are reported to the University. Everything you turn in must be your own original work. If you are unclear about this policy or my expectations, you must notify me immediately. Claiming that you did not understand the concepts of plagiarism, proper referencing, or cheating will not be an acceptable defense after you have already turned in an assignment.

All course materials (class lectures and discussions, handouts, examinations, web materials) and the intellectual content of the course itself are protected by United States Federal Copyright Law. Students are permitted to make notes solely for their own private educational use. Exceptions to accommodate students with disabilities may be granted with appropriate documentation. To be clear, in this class students are forbidden from selling class materials to any person or organization.

Some Use of Generative AI Permitted Under Some Circumstances or With Explicit Permission
During this class, we may use ChatGPT, Gemini, Perplexity, or other generative AI applications. You will be informed as to when, where, and how these tools are permitted to be used, along with guidance for attribution. Any use outside of this permission constitutes a violation of Ball State University's Student Academic Ethics Policy.

The Writing Center
All writers improve with practice and feedback, so as a student in this course, you are encouraged to use the Writing Center (in Robert Bell 295 during weekdays, Bracken Library First Floor West in the evenings, or online during any of our regularly scheduled hours) to get additional feedback on your writing. The Writing Center offers free planning, feedback, and accountability sessions (in person and online) to all students composing essays, reports, reflections, research projects, web content, lesson plans, slideshows, poster presentations, resumes, and other digital or print texts. To schedule a free appointment to discuss your writing, go to bsu.edu/writingcenter. Online and in-person appointments are available; however, plan ahead because appointments book quickly!

The Basic Needs Hub
If you are having difficulty affording enough food, do not have a safe and reliable place to sleep, and/or experiencing an emergency or crisis, help is available through the Basic Needs Hub. The Basic Needs Hub has information, resources, and provides individualized support to students. To talk with a supportive staff member about your experience, receive one on one assistance, or learn more about resources, you can submit a Basic Needs Assistance Form.

The Counseling Center
The Ball State University Counseling Center offers free and confidential services to all students. The Counseling Center is located in Lucina Hall, Room 320. To schedule an appointment, you can contact us at 765-285-1736. Ball State also offers a 24/7 Crisis Line, which can be reached at 765-285-HOPE (4673). The Crisis Line is a mental health resource for those who are struggling with any mental health concerns, including thoughts of self-harm and/or suicide.
At the Ball State Counseling Center, we see students for a variety of reasons, some of which include homesickness, relationship concerns, anxiety, and depression. At your first appointment, you will work with a therapist to create a plan that will connect you with resources that best fit your needs. We assist students with getting connected to therapy at our Center as well as connecting students to self-help resources, other on-campus resources, and community-based resources. All Ball State students also have access to several on-demand, self-help resources through a variety of different platforms. All of these resources, including a direct link to our website, can be found here.

The Speaking Center
The Speaking Center is a free resource available to all members of the BSU community wanting to improve their public speaking abilities. We offer personalized coaching designed to help you become a more confident and effective speaker. Our trained coaches provide constructive feedback and support throughout the entire speech preparation process, whether you are in the early stages of brainstorming ideas and organizing your thoughts, or you need to practice your delivery and refine your message.
The Center is in the David Letterman Communication and Media Building, room 302. To schedule an appointment, please access us through your Navigate app or use this direct link to sign up for a time**.** Appointments are available both in person and on Zoom. Appointments are available in person, on Zoom, and in virtual reality (VR) for those interested in practicing in an immersive speaking environment.

FERPA
The Family Educational Rights and Privacy Act ensures the security and confidentiality of your student information, including your grades. As you are adults, I am not allowed to discuss your performance in this course with anyone outside of the University without your explicit written permission.

Assurance of Learning
The Miller College of Business is committed to ensuring that every student graduating with an MBA is competent in the following four areas that are crucial to success in business. These learning goals can be remembered with the acronym **LEAD** (Leadership, Ethics, Analytics, and Decision Making).

- L (eadership)—Develop leadership skills
- E (thics)—Recognize and address ethical business issues
- A (nalytics)—Apply econometrics and data analytics
- D (ecision Making)—demonstrate effective evidence-based decision making

In this class, you will demonstrate:

- **Ethics**, by discussing ethical ways to implement quantitative models and evaluate results.
- **Analytics**, by learning, applying, and evaluating a multitude of analytical methods.
- **Decision making**, by practicing analytics-based decision making.

Tentative Course Outline

The following list of chapters to be covered is *tentative*, and I reserve the right to change the order in which material is covered. Dates on Canvas may change depending on the pace of the class.

Section 1. Review of Basic Statistics
Excel overview and data cleaning
Chapters 1-7 (Normal Dist., Sampling Dist. of the Mean, Central Limit Theorem)
Chapters 8-9 (Confidence Intervals, Hypothesis Testing)

- Problem Set 1: due Friday, February 6.

Investment portfolio applications of basic statistics

Section 2.
Chapter 10: Statistical Inference About Means and Proportions with Two Populations; A/B Testing
Introduction to R for Statistical Analysis
Automate real-time data acquisition via R packages and APIs.
Monte Carlo Simulation, Bootstrapping, & Block Bootstrapping with Finance Applications
Spatial and Geographic Analysis (time permitting)

- Problem Set 2: due Friday, February 27.

Section 3.
Chapter 14: Simple Linear Regression
Chapter 15: Multiple Regression
Regression Modelling Extensions and Applications:

- Model nonlinear relationships
- Add fixed effects to models; financial portfolio employee performance application
- Build and evaluate predictive models for numerical prediction and binary classification in R
- Training sets and test sets; in-sample versus out-of-sample performance

Causal Inference Research Designs with Applications In R

- Randomized Controlled Trials, Differences-in-Differences, Regression Discontinuity
- Problem Set 3 (predictive analytics): due Sunday, March 22 *(individual Problem Set)*

Time Series Analysis and Forecasting with Applications In R

- Regression, autoregressive, moving average, ARIMA, exponential smoothing, Meta's Prophet
- Problem Set 4 (forecasting): due Sunday, April 19 *(individual Problem Set)*

Linear Programming (also called Linear Optimization)

The Final project deliverables take the place of a conventional final exam.

- Zoom final project presentations: Tuesday of Week 16 to Tuesday of finals week
- Final project deliverables due Wednesday, April 29 at 10:00 pm ET.