Statistics and Quantitative Methods (MBA 611)

Fall 2026 Syllabus

Sections 800/801: Asynchronous Online; optional dedicated student hour 6:00 - 7:00 pm ET on Tuesdays

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Professor: Dr. Paul Niekamp
E-Mail: pniekamp@bsu.edu
Office: WB 137 (or virtual via Zoom)
Office Phone: 765-285-5187
Office Hours: Tuesday & Thursday noon – 3:00 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 Numbers, 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 approaches).

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:	15%
Individual Data Exercises:	20%
Two Group Problem Sets:	15%
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 the 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.

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.

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.

Ball State First Day
This course is part of our course material delivery program, Ball State First Day. The bookstore will provide each student with a convenient package containing all required physical books and any digital materials will be integrated into Canvas for this course.

You should have received an email from the bookstore confirming materials provided for each of your courses and asking you to select how you would like to receive any printed components (in-store pick up or home delivery). If you haven't done so already, please confirm your fulfillment preference so the bookstore can prepare your materials. Students who do not want to participate in the First Day program may choose to opt out.

To access your digital materials within Canvas:

Delivery Method	**Direction**
eBook	Select the "Course Materials" link
Courseware – SSO Partner Integration	Select the "Course Materials" link
Courseware – Access Code Reveal	Reveal the access code in the "Course Materials" link and redeem the code at the link provided on that page, or in the publisher's integration in Canvas
Courseware – Publisher Direct	Select the publisher's link in your course

Title IX
Ball State University is committed to maintaining an educational environment free from sex discrimination, including sexual harassment, sexual misconduct, dating and domestic violence, and stalking. Students who

experience or witness conduct that may violate University policy are encouraged to seek support and assistance. The Title IX Office can provide information about reporting options, supportive measures, and available resources. Contact the Title IX Office at 765-285-1545 or titleix@bsu.edu.
Please Note: As your instructor, I am a mandatory reporter. If you disclose information to me about conduct that may constitute sex discrimination or sexual misconduct, I am required to notify the Title IX Coordinator. The Title IX Office will reach out to discuss available resources, supportive measures, and reporting options. If you wish to speak with someone confidentially, you may contact the Counseling Center or the Center for Survivor Support.

Pregnancy and Related Conditions

Ball State University provides reasonable modifications for students affected by pregnancy, childbirth, or related medical conditions. Students seeking academic, housing, or other modifications are encouraged to contact the Title IX Office as early as possible to discuss available options and support. For assistance, contact the Title IX Office at 765-285-1545 or titleix@bsu.edu.

University Grade Appeal Policy

If you believe you received a final course grade that does not reflect your performance due to fairness or a procedural issue, you have the right to file an appeal within 5 school days after final grades are posted by the Office of the Registrar. Review the University Grade Appeal Policy and Process.

Student Academic Ethics Policy

Honesty, trust, and personal responsibility are fundamental attributes of the university community. Academic dishonesty and other forms of academic misconduct threaten the foundation of an institution dedicated to the pursuit of knowledge and will not be tolerated. To maintain its credibility and reputation, and to equitably assign evaluations of scholastic and creative performance, Ball State University is committed to maintaining a climate that upholds and values the highest standards of academic integrity. Visit the VPAA's academic integrity website (Students tab) for resources on understanding academic integrity, citing sources properly, and avoiding inadvertent academic dishonesty. To learn about BSU's academic integrity expectations and students' rights, please read the University Student Academic Ethics Policy.
Academic integrity violations include giving or receiving an unfair academic advantage (cheating), presenting someone else's ideas or work as your own (plagiarism), and falsifying academic records. Unless otherwise indicated, you must work independently by yourself. Check with me if you are unsure whether something constitutes academic dishonesty. Examples of academic integrity violations include but are not limited to:

- Using resources not authorized by the faculty member (including devices, AI tools, hidden notes, and open books)
- Using a generative AI system or a person to complete academic assignments such as response papers, discussion posts, essays, or any other assignment when such use is not explicitly permitted by the assignment instructions or the instructor.
- Utilizing another person or a generative AI system to take a quiz, examination, or similar evaluation in place of oneself.
- Using a generative AI system for research, creative work, theses/dissertations, grant proposals, IRB-regulated work, or publication-bound work in violation of university AI policies, funder/publisher rules, IRB requirements, or discipline-specific standards.
- Presenting as one's own work the ideas, representations or words of another person or of a GenAI system without customary and proper acknowledgment of sources or of the AI tool(s) used.
- Using generative AI systems to analyze data, conduct research, or generate content that is included in an assignment (images, graphs, charts, tables, etc.) without proper documentation, citation, and attribution of this AI use.

- Using commercial study websites to find answers to graded assignments (Chegg, Course Hero, StudyPool, OneClass, etc.).
- Without the instructor's written permission, giving away, buying, or selling graded assignments class notes, exams, study guides, or other course materials to other students or to third-party vendors (Course Hero, Chegg, 24HourAnswers, etc.).
- Working with another person on any assignment other than authorized group projects.
- Sharing or allowing others to access your files, whether done with permission or not.
- Reusing your own work from another semester, course, or section.
- Sharing answers with others during exams (passing notes, texting, whispering, gesturing)
- Discussing exam questions and answers with students who have not taken the exam.
- Soliciting others to complete work for you.

Generative AI (GenAI) Statement

Conditional Use (Specific or limited GenAI use permitted)

At Ball State, we use GenAI to elevate human potential, not replace it. To succeed in an AI-infused world, students must balance technical skills with durable skills, lifelong abilities such as critical thinking, ethical judgment, communication, accountability, and responsible decision-making that define a Ball State graduate. Developing these durable skills requires you as students to think carefully about:

- when AI should and should not be used;
- how to use AI responsibly;
- how to verify AI-generated information; and
- and how to remain accountable for final work.

You may use generative AI applications for some work submitted in this course. 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. When in doubt, please ask me before using GenAI. You, the student, are always responsible for the content you submit, publish, share, or act upon, regardless of whether GenAI tools assisted in the process. For data security reasons, please use BSU-approved GenAI tools (e.g., BSU Gemini, NotebookLM), which support single sign-on (SSO) with BSU ID and password. Commonly used public GenAI tools carry a higher risk of data being shared externally. In contrast, when using BSU-approved GenAI tools, any data you input is protected within the BSU system. Instructors do not have access to BSU IT Center logs of AI tool usage, so student data shared through BSU-approved GenAI tools remain private.

The Learning Center

The Learning Center offers free Tutoring and Academic Coaching for many courses at Ball State. Students can make appointments for online (Zoom) or in-person (NQ 350) appointments. To make an appointment, visit myballstate.bsu.edu and click on "Navigate" in the Academic Tools section, or just go directly to bsu.navigate.eab.com.

Testing accommodations for students with disabilities are available for students who have received the appropriate documentation from Disability Services. Tests may be administered in the Learning Center. Supplemental Instruction is available in select courses. If you have an SI leader for your course, that person will provide students with information the first week of school regarding weekly study sessions. For more information about Learning Center programming, visit bsu.edu/learningcenter or call 765-285-1006. Follow us on Instagram: BallStateLC.

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 to get additional feedback on your writing. The Writing Center can help you at any stage of the writing process, whether you're just getting started and need help brainstorming or when you're wrapping

up a project and just want a second set of eyes. We work with writers from all disciplines and with all kinds of writing, including essays, reports, reflections, research projects, web content, lesson plans, slideshows, poster presentations, resumes, and other digital or print texts.

You can choose from three appointment types: getting started on a new project (Planning appointment), discussing an existing draft (Feedback appointment), or scheduling time to work, with a tutor on hand to keep you motivated (Accountability appointment). To schedule a free appointment, go to bsu.edu/writingcenter. We offer online appointments any time we're open, or you can meet a tutor face-to-face in Robert Bell 295 during weekdays and Bracken Library First Floor West in the evenings. Make sure you 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.

Canvas Accessibility

Canvas provides a user experience that is easy, simple, and intuitive. Special attention has been paid to making Canvas screen-readable. The Rich Content Editor encourages users to create accessible content pages (i.e. text formatting is accomplished using styles). Canvas is designed to allow limited customization of colors

and schemes to be accessible for all users. The National Federation of the Blind granted Canvas the Gold Level Web Certification in 2010. Find more information by visiting the Canvas Voluntary Product Accessibility Template (VPAT).

FERPA and Privacy

As a student, your educational records are considered confidential. Under FERPA (Family Educational Rights and Privacy Act), your records are confidential and protected. Under most circumstances, your records will not be released without your written and signed consent. However, some directory information may be released to third parties without your prior consent unless a written request to restrict this is on file. You can learn more about student rights to privacy by reading Ball State's FERPA and Privacy and Protection.

In this online class, software may be used to record live class discussions. As a student in this class, your participation in live class discussions may be recorded. These recordings typically will be made available only to students enrolled in the class, to assist those who cannot attend the live session or to serve as a resource for those who would like to review content that was presented. Students who prefer to participate via audio only will be allowed to disable their video camera so only audio will be captured. Students who prefer to listen only must disable their audio capability and visual camera. If you have concerns, please discuss these options with me.

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, September 25.

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, October 16.

Section 3.
Chapter 14: Simple Linear Regression
Chapter 15: Multiple Regression
Regression Modeling 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, November 8 *(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, December 6 *(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 15 to Tuesday of finals week
- Final project deliverables due Wednesday, December 9 at 10:00 pm ET.