



Worcester Polytechnic Institute

MME 524 Probability, Statistics & Data Analysis Mathematics Department Fall Term 2023

Associate Teaching Professor:

Michael R. Johnson, PhD – Please feel free to address me by my first name.

Email: mrjohn@wpi.edu

Phone: 508-831-5134

Office location: Armenian Church

No Textbook required:

References used throughout the course. They are all free / open-source resources.

- **Introductory Statistics** (2021), Barbara Illowsky and Susan Dean, ISBN 9781938168208
Download at 'https://openstax.org/details/books/introductory-statistics'
- **Applied Statistics for Engineers and Scientists** (2014); Petrucci, Nandram, and Chen
ISBN 0-13-565953-1 (*Electronic link to free book available on Canvas*)
- **Online Statistics Education: A Multimedia Course of Study** (<http://onlinestatbook.com/>).
Project Leader: [David M. Lane](#), Rice University.
- **Introduction to Probability** (<https://open.umn.edu/opentextbooks/textbooks/21>)
Charles M. Grinstead and J. Laurie Snell, 1997, American Mathematical Society

Course Description:

This is an introduction to statistics for graduate students in the Mathematics for Educators Master's program. Topics covered include descriptive statistics, issues in the design of studies and collection of data, probability, confidence intervals and hypothesis testing for means and proportions from one and two samples, simple and multiple regression, and analysis of one and two-way tables. Statistics using Excel and R will be implemented. The first semester develops background to teach AP Statistics in the classroom. The goal of the second course of the sequence is to develop a statistical classroom or learning project. We will identify a plan to execute the design in the following MME 525 Probability, Statistics & Data Analysis II course.

Prerequisite Courses:

An occasional reference to integral and differential calculus are made but will not be a focus of the course. Material covered is similar to our undergraduate Applied Statistics I and part of Applied Statistics II (MA 2611 and MA 2612) with additional depth in topics such as probability mass and density functions, logic and tradeoffs of Type I and II errors, calculation of Type II error, and basic assumptions of regression residuals.



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Learning Outcomes:

- Reason causation from association and efficiently critique and design studies given sampling constraints and the inference goal.
- Interpret the context of evidence drawn from random sample statistics and their inference about population parameters.
- Select and use confidence intervals and hypothesis tests for mean and proportion in one and two population cases. Distinguish trade-offs for types of errors made in statistics and weigh their potential consequences when conclusions are made.
- Construct linear regression models for multivariate data analysis. Propose causal links and choose variables that fit hypotheses and use software to formulate regression equations and graphs. Interpret the strength of relationships with statistics and observable output.
- Execute a classroom or learning design to develop a statistical study in the MME 525 course.

Communication:

I will also be accessible through Zoom for online office hours. Find link on course page.
R 4-5pm and by appointment.

Technical questions about Zoom? Contact me, Jolene Cotnoir (jcotnoir@wpi.edu) or WPI ATC support (atc-ttl@wpi.edu). I will correspond by e-mail over weekends and engage in discussion boards on Canvas.

Course Approach:

- T 6:30-8:20pm in HA 209 (Forkey Room) with a ten-minute break in between. You can also view a live stream or recording via Echo360 (linked to Canvas course page).
 - Classes from T 8/29-10/10, 10/24-11/14, and 11/28-12/12.
- canvas.wpi.edu links you to the course page.
View Assignments, Modules, and keep up to date with Announcements.
- Lecture is given live every week except for school breaks.
Lecture capture records classes so you can follow a video of the class through if you have missed for any reason. Class Notes are provided under Modules.
- Homework assignments given weekly except for exam weeks or class following an exam.

Course Requirements:

1. Grade Determination Breakdown

A 90-100, B and C.

A score greater than 80 earns at least a B and above 70 is at least a C. Scaling can occur depending on the difficulty of exams. A passing grade (C) will scale no lower than a 65.

Test 1: 35% T, 11/7 6:30pm

- Design of Studies, Descriptive Statistics, Probability and Inferential Statistics



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HW Problem Sets

50% R, 9/7, 9/14, 9/21, 9/28, 10/5, 10/12; 11/2 (x2); 12/7 (x 2)

Project Proposal

15% T 12/12

- *If you cannot complete a homework assignment on the dates listed, please inform me beforehand. I am flexible about conflicts (or illness) on exam dates provided you inform me early and it is not a habit throughout the semester.*

2. Assignments

Assignments are always due via online upload on Thursday. This allows you flexibility to ask questions in the following class week and receive additional help on Thursday online office hours. You should receive feedback in the following week.

3. Late Work Policy

I accept late work with a deduction at times until solutions post for the assignment (no more than 3 days). Please start assignments early and communicate with me to discuss questions. Feel free to talk if you are encounter difficult circumstances.

4. Class Participation Expectations and Criteria

A discussion board is used in Canvas to facilitate conversation and ideas.

Assignments may tie into the discussion board for brainstorming with fellow students.

Basic participation gets basic credit for the work but outstanding posts and replies are the only route to maximum scores.

Technical Requirements:

Access to all software used in the course is available remotely.

Go through WPI VPN GlobalProtect through <https://hub.wpi.edu/software/570/globalprotect> . Login is required.

After logging into the GlobalProtect VPN, access the WPI terminal applications through "Remote Desktop Connection". Search on your computer: "Remote Desktop Connection" -> Type in windows.wpi.edu -> Full login@wpi.edu and Password.

Excel: Use "Analysis Toolpack": File->Options->Add-Ins->Analysis Toolpack->Go.

<https://hub.wpi.edu/Software-Library>

If you want to use a different software program for the course provide proper documentation on assignments and grading can be adapted to your program of choice. I am flexible to your program of preference.



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Library Access:

As a student at WPI, you have access to a variety of resources through the library. Use the link [here](#) to access databases, e-journals, and/or e-books. You will be required to log in with your WPI username and password to access materials.

POLICIES

Academic Integrity:

See school's policy: [*www.wpi.edu/offices/policies/honesty/studentguide.html*](http://www.wpi.edu/offices/policies/honesty/studentguide.html)

Working together is permissible except during exams. When working together you must show individual thought and writing in each problem assigned. Direct copying (and allowing someone to copy directly from you) is not acceptable.

Consequences for violating the Academic Honest Policy range from earning a zero on the assignment, failing the course, or being suspended or expulsion from WPI.

The Dean of Students Office maintains judicial records for any act of academic dishonesty.

Common examples of violations include:

- Copying and pasting text directly from a source without providing appropriate citation
- Paraphrasing or summarizing from a source without providing appropriate citations
- Turning in work where a good portion of the work is someone else's, even if properly cited.

Academic Accommodations:

We strive to create an inclusive environment where all students are valued members of the class community. If you need course adaptations or accommodations, or if you have medical needs that may affect your performance or participation in this course, please make an appointment with us as soon as possible. If you have approved accommodations, please request your accommodation letters online through the Office of Accessibility Services student portal. If you have not already done so, students with needs who plan to utilize accommodations for this course are encouraged to contact the Office of Accessibility Services as soon as possible to ensure that such accommodations are implemented in a timely fashion.

Email – AccessibilityServices@wpi.edu

Phone – (508) 831-4908

On Campus – Daniels Hall, First Floor 124

Please know it is important to me that you feel you are in the best position to succeed in the course. If you need accommodations and there is anything I can do to help, I will be happy to assist to the best of my abilities.



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Class Schedule

Topics

Class 1 T, 8/29

Course Introduction and

Class 2 T, 9/5

Class 3 T, 9/12

Class 4 T, 9/19

Class 5 T, 9/26

Class 6 T, 10/3

Class 7 T, 10/10

----- A-B Term Break -----

Class 8 T, 10/24

Class 9 T, 10/31

Class 10 T, 11/7 Exam 1 – Material class from 1 - 8

Class 11 T, 11/14

===== Thanksgiving Break =====

Class 12 T, 11/28

Class 13 T, 12/5

Class 14, T, 12/12 Project Plan for MME 525 Part II

Two-part course – continue to MME 525 – Spring Term 2024