Worcester Polytechnic Institute

MME 525 Probability, Statistics & Data Analysis II
Mathematics Department
Spring Term 2024

Instructor: Michael R. Johnson, PhD (Associate Teaching Professor)
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Textbook (and/or other Required Materials):
Buy this or download free:
Applied Statistics for Engineers and Scientists (1999); Petruccelli, Nandram, and Chen
ISBN 0-13-565953-1 (Electronic link to book available on Canvas – it is free!)
Introductory Statistics (2023); Barbara Illowsky and Susan Dean, 2nd Ed, ISBN-13: 978-1-711472-57-7
https://openstax.org/details/books/introductory-statistics-2e (Open Source license)

Course Description:
This is an introduction to statistics for graduate students in the Mathematics for Educators Master's degree program. Topics covered include hypothesis testing, multiple variable regression, chi-square statistical analysis, one and two-way tables (ANOVA) and nonparametric tests. The goal of this sequence is to develop a statistical classroom or learning project. We will identify a plan to execute the design.

Prerequisite Courses:
MME 524 (or equivalent background) is strongly recommended.

Learning Outcomes:
- Select 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 variable forms that fit hypotheses and use software to formulate regression equations and graphs. Interpret the strength of relationships with statistics and observable output.
- Hypothesis testing using chi-square and F-distribution tables for frequency tables and ANOVA statistical contexts. Recognize where the assumption of normality is not appropriate and make use of alternative nonparametric tests when required.
- Execute a classroom or learning design to develop a statistical study.

Office Hour:
W 6:30-7:30pm and by appointment online by Zoom.
My schedule is very busy after 1:30pm daily – but have flexibility in the morning if you are free.

Course Approach:

- R 4:30-6:20pm on Zoom (No in-person live students in 2023-24)
- Classes every Thursday 1/11-2/15 and 2/29-4/11 (and F, 4/12 or R, 4/18).
  School vacation week February 19-23.
- 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 also 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.
   Exam

30%	T 2/15	Hypothesis Testing, Multivariable Regression, Chi-square procedures, and ANOVA

   HW Problem Sets

30%	F, 1/19, 1/26, 2/2, 2/9; F, 3/8, 3/15, 3/22, 3/29

   Project and Presentations (Two classes worth)

40%	R, 4/11 – F, 4/12 (4:30-6:30pm or a group at a different time if preferred.)

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

2. **Assignments**
   Assignments are always due online on Fridays. There will be a few off-weeks for HW.
   Corrections are typically finished by 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 a week). 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 participation scores.

Technical Requirements: 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.

Other Software: Optional use of programs such as MATLAB and R.
You can find MATLAB, R, and other options through Remote Desktop Connection.
For your own personal computer make use of WPI downloads: https://hub.wpi.edu/Software-Library. **If you want to use a different software program** for the course, provide
documentation on assignments and grading can be adapted to your program of choice. I am
flexible to your program of preference.

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*
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 appropriately cited
  credit
- Paraphrasing, summarizing, or rephrasing from a source without providing appropriate
  citations
- Collaborating on individual assignments
- Turning in work where a good portion of the work is someone else's, even if properly
  cited

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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 – AccessabilityServices@wpi.edu
Phone – (508) 831-4908
On Campus – Unity Hall 5th floor

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