**ENGR 200 101Z**
***Engineering Statistics & Probability***
**Meeting Information:**DCOB288; MW 12:30PM - 01:45PM;
25FALL

Instructor

Maggie Foley

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**Office Location:**DCOBT 118A

**Office Hours:**Monday-Thursday, 2PM-3PM, and by appointment

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*Fundamental to Jacksonville University’s mission is support for an environment where divergent ideas, theories, and philosophies can be openly exchanged and critically evaluated. Consistent with these principles and the concept of Academic Freedom, this course may involve the discussion of ideas that you find uncomfortable, disagreeable, or even offensive. These ideas are intended to be presented in an objective manner, they are not intended to persuade, and are not an endorsement of what you should personally believe.*

*Jacksonville University values diversity, equity, and inclusion and strives to create a welcoming community where all stakeholders feel valued and a sense of belonging. We believe in lifelong learning and preparing globally-minded citizens for the real world. We recruit students, faculty, staff, and leaders from all over the globe and we respect differences in ability, age, appearance, athletic and student organization involvement, ethnicity, faith, gender, gender expression, immigration status, language, military/veteran status, nationality, political ideology, race, religion, talent, sex, sexuality, socio-economic status, and other personal identities and experiences.*

*Jacksonville University is an equal-opportunity institution and prohibits discrimination. We consider each stakeholder to be a key player in Jacksonville University's civic responsibility and commitment to this work.*

*The non-discrimination policy can also be found on the*[*Green Pages*](https://www.ju.edu/greenpages/university-policies.php)*.*

Course Objectives/Learning Outcomes

After completing this course, students should be able to:

1. Explain why statistics is essential in engineering.
	* Understand how statistics supports decision-making in design, quality control, and problem analysis.
2. Describe basic probability concepts and distributions.
	* Differentiate between discrete and continuous variables and recognize common probability distributions.
3. Use descriptive statistics to summarize engineering data.
	* Compute and interpret measures such as mean, median, variance, and correlation.
4. Understand and apply estimation techniques.
	* Estimate parameters like means and variances, and understand the concept of sampling distributions.
5. Conduct hypothesis testing.
	* Perform and interpret single-sample (and introductory two-sample) hypothesis tests in engineering contexts.
6. Perform simple and multiple linear regression analysis.
	* Build models, interpret regression outputs, and understand correlation using real-world datasets.
7. Apply statistical tools using engineering datasets.
	* Work with the “Engineering Robot Datasets” to analyze real data via statistical software or tools.
8. Communicate results clearly using engineering language.
	* Present findings and implications effectively, both in writing and orally, within a technical engineering framework.

Class Format

Lectures will be combined with discussions of textbook examples, practice problems, and real engineering data. Students are expected to participate by asking questions, working through examples, and joining class discussions.

Required Texts & Materials

https://ju.bncollege.com/course-material/course-finder

Applied Statistics and Probability for Engineers

**ISBN:**978-1-119-49748-9

**Authors:**Montgomery, Runger, & Hubele

**Publisher:**Wiley

**Edition:**7th

Grading

| **Point Total** | **Letter Grade** | **% of Total Course Points** |
| --- | --- | --- |
| 90-100 | A | 90 - 100% |
| 89 - 90 |   A-  | 89-90% |
| 87-89 |   B+ | 87-89% |
| 80-87 | B | 80-87% |
| 79-80 |  B- | 79-80% |
| 77-79 |  C+ | 77 - 79% |
| 70-77 | C | 70-77% |
| 69-70 | C- | 69-70% |
| 67-69 |   D+ | 67-69% |
| 60-67 | D | 60-67% |
| Less than 60 | F | Less than 60 |
|   |   |   |

Course Grading

* Two Midterm Exams – 40%
* Final Exam – 30%
* Quizzes – 10%
* Homework – 10%
* Term Project – 10%

Term proejct:

Predicting Student Final Course GPA Using Multivariate Analysis

Objective

Use real or simulated academic performance data to explore, analyze, and model how different factors (e.g., HS GPA, SAT scores, study habits, participation, etc.) affect a student’s final course GPA in an engineering class. This project integrates concepts and tools from all chapters covered (Ch. 1–12).

Dataset

A sample dataset (ENGR200\_Term\_Project\_Data.xlsx) with 150 student records has been provided. Students may alternatively use their own dataset if approved by the instructor.

Required Analysis

Each group must perform the following tasks using Excel:

1. Descriptive statistics (mean, median, standard deviation)
2. Histograms of key variables
3. Scatter plots between predictor variables and Final GPA
4. Correlation matrix of all continuous variables
5. Simple linear regression (e.g., Final GPA ~ HS GPA)
6. Multiple linear regression with at least 4 predictors
7. R², Adjusted R², p-values, standard error
8. Residual analysis (residual plots, normality checks)
9. Multicollinearity check (VIF)
10. Interpretation of coefficients and model fit

Excel Functions and Tools Required

Use as many of the following Excel tools/functions as possible:

* AVERAGE, MEDIAN, STDEV.S, COUNT, CORREL, NORM.DIST, IF, LINEST, INTERCEPT, SLOPE, RSQ, SQRT, SUMSQ
* Data Analysis Toolpak: Descriptive Stats, Histogram, Regression

Final Deliverables

Each group will submit the following:

1. An Excel workbook showing all analyses and charts

2. A 5–8 page written report in Word including:

* - Introduction to the dataset and variables
* - Description of statistical methods used
* - Summary of findings with interpretation
* - Charts/tables embedded with captions
* - Discussion of model assumptions and limitations

Deadline

Final project is due in Week 14.

Grading Criteria (100 Points)

1. Depth and accuracy of statistical analysis – 40 points

2. Excel implementation and tool use – 25 points

3. Written report clarity and insight – 25 points

4. Professionalism and teamwork – 10 points

Flexibility

Students may use a different dataset with instructor approval (e.g., Kaggle data, sports, health, etc.) as long as it allows regression modeling with multiple predictors.

Attendance Policy

Students will take a quiz at the end of each class as an attendance check.

Make-Up Exams/Assignments

Students who miss an assignment or exam for a valid reason must present documentation (from a medical doctor, a coach, a representative from student life, or other university official) to make it up. Students should notify the instructor before the exam to indicate that they will be missing the exam.

Using Electronic Devices

The use of laptop computers, tablets, cell phones, or any other electronic devices during face-to-face class sessions is generally not allowed unless there are specific class assignments that require them. Comprehension, attention, and note taking all tend to improve when students are not using electronic devices.

Extra Credit

In addition to the extra credit opportunities listed below on the schedule, the instructor may offer other extra credit opportunities, but students may earn no more than 5 extra credit points.

Schedule of Readings and Assignments (subject to change)

Week 1 (Intro)

* Chapter 1 – Role of Statistics in Engineering

Weeks 2–3

* Chapters 2–3 – Probability & Discrete Distributions

Weeks 4–5

* Chapter 4 – Continuous Distributions
* Chapter 5 – Joint Distributions
* **First Midterm Exam at the end of Week 5**

Week 6

* Chapter 6 – Descriptive Statistics

Week 7

* Chapter 7 – Point Estimation & Sampling Distributions

Week 8

* Chapter 8 – Statistical Intervals (Single Sample)

Week 9

* **Second Midterm Exam**

Week 10

* Chapter 9 – Hypothesis Testing (Single Sample)

Week 11

* Chapter 10 – Two-Sample Inference (brief overview)
* Introduce Term Project data & requirements

Week 12

* Chapter 11 – Simple Linear Regression & Correlation
* Project check-in: outline and preliminary analysis due

Week 13

* Chapter 12 – Multiple Linear Regression (main concepts + interpreting output)
* Continue project analysis during class/lab time

Week 14

* Finish Multiple Regression (optional topics and examples)
* Review key topics for final exam
* In-class Q&A and project work time

**Final Exam Week**

* Final Exam
* **Term Project due**

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Academic Honesty

“Members of the Jacksonville University community are expected to foster and uphold the highest standards of honesty and integrity, which are foundations for the intellectual endeavors we engage in.

To underscore the importance of truth, honesty, and accountability, students and instructors should adhere to the following standard:

***“On my honor as a student of Jacksonville University, I promise to uphold the values of honesty, trust, fairness, respect, and responsibility in all my dealings with faculty, staff, and students.”***

Academic misconduct occurs when a student engages in an action that is deceitful, fraudulent, or dishonest regarding any type of academic assignment that is intended to or results in an unfair academic advantage. In this context, the term “assignment” refers to any type of graded or ungraded work that is submitted for evaluation for any course. Academic misconduct includes but is not limited to cheating, collusion, falsification, misrepresentation, unauthorized collaboration on assignments, copying another student’s work, using or providing unauthorized notes or materials, turning in work not produced by the individual, attempting to get credit for a single instance of work submitted for more than one course, and plagiarism. Furthermore, providing deceitful, fraudulent, or dishonest information during discussions of an academic matter with faculty are also examples of academic misconduct.” (Jacksonville University Academic Integrity Policy <https://www.ju.edu/academicintegrity/academic-integrity-misconduct-policy.php> )

Throughout this course we will be reading and reporting about the work of others. All information that is not original to the student must be appropriately attributed in both presentations and written work. All students are expected to do their own work and give appropriate credit for all sources used in the process of preparing papers, presentations, and homework assignments. Group assignments will be graded based on the product of the work, although some adjustment may be made for participation. [If you have a question about whether or not collaboration is allowed, or how to cite a reference, please ask. It is always better to check than to be accused of an unintended violation of the academic honesty policy.] Violations of the academic honesty policy will be dealt with in accordance to university policies [Refer to current Academic Catalog “Academic Integrity and Misconduct”].

Course Level Penalties

Course Level Penalties: A first offense may result in a failing grade for the assignment. Second offenses may result in failure in the course. Significantly egregious violations may result in expulsion from the university. When in doubt give credit for all information that did not come directly out of your head!

Statement Regarding Use of Generative Artificial Intelligence (AI)

Jacksonville University recognizes the power and potential in Artificial Intelligence to assist in many areas of scholarship represented at the institution. AI, like ChatGPT and others, has the potential to be misused. In general, the Academic Integrity Policy stated in this document and elsewhere in Jacksonville University publications and websites does not encourage AI use in an academic setting. AI produced materials submitted for graded assignments are falsely representing the work as generated solely by the student. The specific use of AI is left up to the individual instructor and should be articulated on course syllabi and in the instructions for individual assignments. If instructors do not give explicit permission to use AI students should assume that its use will constitute a violation of the Academic Integrity Policy of Jacksonville University.

Disability Statement

Students with a documented disability requesting classroom accommodations or modifications, either permanent or temporary, resulting from the disability are encouraged to register with the Disability Support Services (DSS) office. This office will assist in recommending accommodations that eliminate barriers in academic coursework and/or guide you through the different supportive mechanisms that we have to offer. This office is located on the third floor of the Davis Student Commons, room 336. The office can also be contacted through their website (<https://www.ju.edu/disabilityservices/index.php>).

Note: Students are encouraged to register with the DSS office at the beginning of the term and/or prior (if/when possible), as accommodations are not provided retroactively.

FERPA

The Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education. Information on Jacksonville University's FERPA policy is available at: <https://www.ju.edu/about/ferpa-information.php>

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