ISE 315: Engineering Statistics

Lecture 1: Introduction and Logistics

Instructor: Mansur M. Arief, PhD
Industrial and Systems Engineering, KFUPM

Office: 22-219 — Email: mansur.arief@kfupm.edu.sa

Based on Montgomery & Runger, Applied Statistics and Probability for Engineers, 6th Ed.

Meeting 1

Course Introduction & Logistics

Lecture 1 Outline

- About your instructor
- Course logistics and policies
- Why statistics for engineers?
- About you and your classmates
- Introduction to point estimation

About Your Instructor

Mansur Maturidi Arief

Background:

- PhD in Mechanical Engineering, Carnegie Mellon University
- Former Researcher, Stanford (AI Safety and Minerals Supply Chains)
- Former Executive Director, Stanford Center for AI Safety

Feel free to reach out!

Research Interests:

- AI safety & certification
- Decision-making under uncertainty

Contact Information:

Office:	22-219
Office Hours:	See Blackboard

Course Information

ISE 315: Engineering Statistics

Course Details:

- Credit Hours: 3
- Prereq: ISE 205 or STAT 319
- Semester: 252

Class Schedule:

- Lectures: Sundays and Tuesdays, 12:30 PM - 13:45 PM
- Location: 24 - 240-1

Required Textbook:
Montgomery & Runger, 6th Edition, *Applied Statistics and Probability for Engineers*, Wiley

Additional Resources:

- Gradescope (homework assignments and quizzes)
- Blackboard (announcements, schedules, slides, solutions)
- Course website (TBA - readings, AI tutor, extra office hour links)

Course Policies

Attendance:

- Regular attendance is expected and will be monitored
- DN grade may be assigned for excessive absences ($>20\%$)

Academic Integrity:

- All work must be your own
- Cheating or plagiarism will result in zero grade and disciplinary action

Homework:

- Assigned weekly, due at the beginning of class
- Late submissions: 20% penalty per day (max 2 days)
- Submit your own work, do not copy from others (including AIs)

Exam Policies

TBA - Will be synchronized with the other sections

Exam Schedule:

Exam	Tentative Date
Midterm 1	Chapters 7–10
Midterm 2	Chapters 10–12
Final Exam	Chapters 12-14(Comprehensive)

No makeup exams without prior approval and valid documentation.

Course Overview

What will we learn?

Part 1: Estimation

- Point estimation
- Sampling distributions
- Confidence intervals

Part 2: Hypothesis Testing

- One-sample tests
- Two-sample tests
- Goodness-of-fit tests

Part 3: Modeling

- Simple linear regression
- Multiple regression
- Design of experiments (intro)

Why Statistics for Engineers?

Engineers deal with uncertainty every day

Quality Control

- Is this batch within specs?
- How many defects should we expect?

Process Improvement

- Did the new process improve yield?
- Which factors affect output most?

Reliability Engineering

- What is the expected lifetime?
- When should we schedule maintenance?

Design & Testing

- How many samples do we need?
- Is the new design better?

Real-World Applications

Statistics in action

Manufacturing

- Six Sigma quality control
- Process capability analysis
- Acceptance sampling

Supply Chain

- Demand forecasting
- Inventory optimization
- Supplier quality evaluation

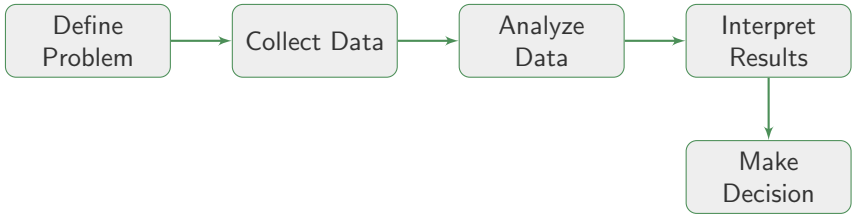
Oil & Gas Industry

- Reservoir estimation
- Equipment reliability
- Safety risk assessment

AI & Robotics

- Testing AI systems
- Communicating AI risk
- AI safety

The Statistical Approach



This course focuses on:

- **Estimation**: What are the parameter values?
- **Hypothesis Testing**: Is there a significant effect?
- **Modeling**: What relationships exist in the data?
- **Uncertainty Quantification**: How confident are we?

Tips for Success

Do:

- ✓ Attend all lectures
- ✓ Practice problems regularly
- ✓ Start homework early
- ✓ Ask questions in class
- ✓ Visit office hours
- ✓ Form study groups
- ✓ Review before each exam

Don't:

- × Cram the night before
- × Skip homework
- × Wait until you're lost to ask
- × Memorize without understanding
- × Rely solely on lectures

Statistics requires practice!
The more problems you solve, the better you'll understand.

Questions?

Any questions about the course, policies, or logistics (or anything else)?

Introduce yourself

Now please introduce yourself

- name
- department
- one thing you like/dislike about statistics or AI (or anything else)

Questions?

Now let's begin with the course content...

Chapter 7: Point Estimation of Parameters and Sampling Distributions