New Jersey Institute of Technology
Department of Engineering Technology
MNET 315 Industrial Statistics

COURSE NUMBER MNET 315

COURSE DESCRIPTION Industrial Statistics

COURSE STRUCTURE (2-2-3) (lecture hr/wk - lab hr/wk – course credits)

COURSE COORDINATOR/ INSTRUCTOR Dr. S. Lieber/ A. Chaudhuri

COURSE DESCRIPTION This course introduces students to the basic statistical concepts, definitions, methodologies, formulas and tables that are used throughout industry. Major topics include descriptive and inferential statistics, probability, confidence intervals, hypothesis testing, correlation and regression, and nonparametric tests. Students study various Discrete and Continuous Distributions. They learn to use the z, t, $\chi 2$, and F tests, and ANOVA. Case studies and examples show how statistics are used to solve problems in the real world.

PREREQUISITE(S) MATH 138 or MATH 111

COREQUISITE(S) None

REQUIRED MATERIALS

1. Larson and Farber, Elementary Statistics – Picturing the World, Prentice Hall, 8th edition, 2022, ISBN 9780137493326
2. Statistical Calculator

COMPUTER USAGE Excel (optional), Minitab (optional), PowerPoint

COURSE OUTCOMES (CO)

By the end of the course students should be able to:

1. Define, comprehend, use basic Statistical terminology.
2. Design a basic statistical sampling plan.
3. Create, graph and analyze frequency distributions.
4. Create, graph and interpret histograms, stem & leaf diagrams, box plots, Pareto Diagrams and similar displays of quantitative data.
5. Calculate, interpret & use various measures of central tendency, variation, and position. (Mean, Median, Mode, Range, Standard Deviation, Variance, etc.)
6. Explain and use the basic concepts of probability and counting, including the Multiplication and Addition Rules, Combinations, Permutations and Distinguishable Permutations.
7. Differentiate between continuous distributions and discrete distributions.
8. Correctly apply the binomial, geometric and Poisson distributions to real world situations, using the appropriate formulas and tables.
9. Use the Gaussian curve, Standard Normal Table, the Z-formula and transformations, to find probabilities and values, as part of a problem solving process.
10. Understand and apply the Central Limit Theorem.
11. Know when, and how, to use the normal approximation to the binomial, including the correction for continuity.
12. Understand, calculate and interpret confidence intervals for the

mean (large and small samples), population proportions, variance and standard deviation.
13. Calculate minimum sample sizes.
14. Select correct critical values from the binomial table, Poisson table, Standard Normal table, (student) t-table, Chi-Square table, and F-Tables, and use those values as input to hypothesis testing.
15. Conduct hypothesis tests using both the critical value and P-value methods.
16. Use technology (Scientific Calculator, Excel and / or Minitab) to perform Hypothesis Tests.
17. Correctly reject - or fail to reject - the Null Hypothesis, and make correct decisions about Claims.
18. Understand the difference between Causation and Correlation.
19. Perform calculations required for correlation analysis, linear regression and multiple regression.
20. Create Scatter Plots, and graphically display best fit regression.
21. Conduct Chi-Square Tests for Goodness of Fit and Independence.
22. Compare two variances using the F-test.
23. Perform One-Way Analysis of Variance Tests and correctly interpret the resultant ANOVA Table.
24. Under the difference between Parametric and Non-Parametric Tests.
25. Perform basic Non-Parametric Tests, using the appropriate calculations and tables.
26. Analyze, solve and present answers to an assigned team case study via PowerPoint to the rest of the class.

CLASS TOPICS

Data Classification, Experimental Design, Frequency Distributions, Stem & Leaf, Box Plots, Measures of Central Tendency, Variation and Position, Counting Principle, Multiplication and Addition Rules, Permutations and Combinations, Binomial, Geometric, and Poisson Distributions, Normal Probability, Central Limit Theorem, Confidence Intervals for the mean, population proportions, variation and standard deviation, Hypothesis Testing with One and Two Samples, Correlation, Linear and Multiple Regression, Chi Square Tests, F-Test, ANOVA, Sign Tests, Wilcoxon Tests, Kruskal-Wallis Test, Rank Correlation and the Runs test.

STUDENT OUTCOMES

The Course Learning Outcomes support the achievement of the following MET Student Outcomes and TAC of ABET Criterion 9 requirements:

Student Outcome 1 - an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
Related CO – 1 thru 26

Student Outcome 3 - an ability to apply written, oral, and graphical

communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
Related CO – 26

Student Outcome 5 - an ability to function effectively as a member as well as a leader on technical teams.
Related CO – 26

GRADING POLICY

Attendance & Participation	10%
Homework / Quiz (4)	20%
Team Case Study	10%
Tests (T-1, Mid Term, T-3 & Final)	60% (10+15+10+25)

Quiz/HW/Test will be announced in The Class / Learning Management System.
Mid-term will be 1 wk before last drop date and Final as per schedule)

*Note:
1. These % might be changed depending on overall performance of the class.
2. Extra Credit: Might be considered in the later part of the semester. These are discretion of the instructor.

Grading Scale:

Grade	Total %
A	90 up
B+	85-89
B	80-84
C+	75-79
C	70-74
D	60-69
F	Less than 60

* Please remember that a grade is earned not given out. So, students must own responsibility to complete tasks, and perform best in the HW/Quiz/Test

ACADEMIC INTEGRITY

NJIT has a zero-tolerance policy regarding cheating of any kind. Student behavior that is disruptive to the learning environment will not be tolerated. Incidents will be reported to the Dean of Students. Honor Code violations may result in failure in the course, disciplinary probation, and/or expulsion from NJIT. Refer to http://www.njit.edu/academics/honorcode.php.

STUDENT BEHAVIOR

- Students expected to arrive on time & stay entire class.
- Electronic communication devices turned off.
- Laptop/ computers for academic/class purposes, are OK.

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- Class time should be participative.
- You should try to be part of the discussion
- Just dropping a mail to notifying inability to come to the class, does not earn attendance. Exceptions are only for any exigency or emergency in family or medical reasons (needs documents/proofs); and considered only for test and make-up (only one time)

MODIFICATION TO COURSE The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be consulted if any changes occur.

PREPARED BY Ajit Chaudhuri

COURSE COORDINATED BY Dr. S. Lieber

CLASS HOURS

Tuesday	8:30 AM to 10:35 AM	CKB 310
Thursday	8:30 AM to 10:35 AM	CKB 310

OFFICE HOURS

Before Class After Class or By Appointment:
Email chaudhur@njit.edu

GRADING LEGEND

GRADE	NUMERIC RANGE
A	90 to 100
B+	85 to 89
B	80 to 84
C+	75 to 79
C	70 to 74
D	60 to 69
F	0 to 59

GENERATIVE AI

Student use of artificial intelligence (AI) is permitted in this course for certain assignments and activities. It is not permitted to be used in the assignments noted by the instructor, as doing so would undermine student learning and achievement of course learning outcomes. Additionally, if and when students use AI in this course, the AI must be cited as is shown within the NJIT Library AI citation page for AI. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

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COURSE OUTLINE

Week	Dates	Topics & Assignments
1	1/21 1/23	Ch 1 Intro to Stats; Ch 2 Discrete Stats, Ch-3 Probability
2	1/28 1/30	Ch 4 Discrete; Quiz -1 / Review
3	2/4 2/6	**Quiz -1 / Review** **Test-1** on Chapters 1, 2 , 3, 4, 5 (September 19)
4	2/11 2/13	Ch 5 Normal Prabability
5	2/18 2/20	Ch 5 Normal Prabability Ch 6 Confidence Intervals (Z)
6	2/25 2/27	Ch 6 Confidence Intervals (t) and Chi-Square
7	3/4 3/6	**Quiz 2 and Review** **Mid Term Test 2** (Ch 5 and 6)
8	3/11 3/13	Ch 7 Hypo Testing – 1 Samples
SPRING RECESS 3/16-3/22		
9	3/25 3/27	Ch 8 Hypothesis testing - 2 Samples
10	4/1 4/8	**Quiz 3 and Review** **Test 3**
11	4/10 4/15	Ch 9 Correlation and Regression
12	4/17 4/22	Ch 10 Chi-Square and F Distribution, Anova, Ch 11 Non Parametric analysis
13	4/24 4/29	**Ch 11 Non Parametric** **Quiz 4 and review**
14	5/1 5/6	**Our last class. Project Presentation**
TBD		**Final Exam, as per registrar's schedule.**