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

COURSE NUMBER	MNET 315-101
COURSE DESCRIPTION	Industrial Statistics
COURSE STRUCTURE	(2-2-3) (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/ INSTRUCTOR	Dr. S. Lieber/ See Department
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)	Per Guidelines
COREQUISITE(S)	None
REQUIRED MATERIALS	See Instructor Syllabus
COMPUTER USAGE	Excel (optional), Minitab (optional), PowerPoint
COURSE LEARNING OUTCOMES	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 b - an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
Related CLO – 1 thru 26

Student Outcome e - an ability to function effectively as a member or

leader on a technical team;
Related CLO – 26

Student Outcome g - an ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature.
Related CLO – 26

GRADING POLICY

Class Participation	10%
Homework	10%
Team Case Study	10%
Quizzes	10%
Tests (a total of 4 tests)	60%

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

See Individual Instructor Policies, which can include:

- Students expected to arrive on time & stay entire class.
- Electronic communication devices turned off.
- Laptop computers used during class, for academic purposes, are OK.
- Class time should be participative.
- You should try to be part of the discussion.

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

ET Department

COURSE COORDINATED BY

Dr. S. Lieber

New Jersey Institute of Technology
Department of Engineering Technology
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COURSE OUTLINE

Week	Topics & Assignments
1	First Class Handout; First Class PPT; Ch 1 Intro to Statisics
2	Questionnaire due (Introductions); Quiz Zero due; Case 1; Ch 2 Descriptive Stats
3	Ch 1 & 2 Homework & Quizzes Due; Case 2; Ch 3 Probability
4	**TEST** on Ch 1 & 2
5	Ch 4 Discrete Probability; Ch 5 Normal Probability; Case 3
6	Ch 3-4-5 Homework and Quizzes; Case 4 & 5; Ch 6 Confidence Intervals
7	**TEST** on Ch 3-4-5
8	Case 6; Ch 7 Hypo Testing - One Sample; Ch 8 Hypo Testing - Two samples
9	Ch 6-7-8 Homework & Quizzes; Case 7 & 8
10	**TEST** on CH 6-7-8
11	Ch 9 Correlation & Regression; Ch 10 F Distribution
12	Ch 11 Nonparametric Tests; Case 9; Case 10
13	Ch 9-10-11 Homework and Quizzes; Case 11
14	REVIEW; Extra Credit due
15	**Final Exam** Ch 9-10-11