

MIDDLESEX COUNTY COLLEGE
EDISON, NJ
MASTER SYLLABUS

Course ID and Name: MAT 124, Statistics II

Department: Mathematics

Prerequisites: MAT 123, Statistics I

Co-requisites: None

Course Description: Continues the study of hypothesis testing, introduces chi-square analysis, analysis of variance, linear regression and correlation, and non-parametric statistics. Familiarizes students with models and methods used in data analysis. Students will plan an experiment and make inferences about a population based upon sample data collected.

General Education Status: GE MST

Credits: 3 **Lecture Hours:** 3 **Lab Hours:** 0

Textbook(s) and Other Course Materials:

Textbook:

Author: Barbara Illowsky and Susan Dean

Title: Introductory Statistics

Publisher: OpenStax

Required Calculator: TI-83 or 84 or TI-Inspire calculator with the 84 faceplate.

Course Content Areas:

0. Assessing Normality
1. Confidence intervals – one population
2. Hypothesis Testing – one population
3. Inference from Two Samples
4. Correlation and Regression
5. Multinomial Experiments and Contingency Tables
6. Analysis of Variance
7. Non-Parametric Statistics

Learning Outcomes

Content Strand	Students will be able to...
1. Review Assessing Normality	<ul style="list-style-type: none"> a) Create a histogram to assess the normality of a data set b) Create a boxplot to assess the normality of a data set c) Create a Normal Probability Plot to assess normality d) Use the Empirical Rule to assess the normality of a data set
2. Formulate Conclusions Through Inference Using Confidence Intervals	<ul style="list-style-type: none"> a) Recognize point estimates for population parameters b) Describe what a confidence interval is for a population parameter c) Summarize properties and characteristics of the T distribution d) Identify critical value needed to use the t-distribution for a CI. e) Calculate and interpret confidence interval estimates for mean using z and t-distributions as appropriate. f) Calculate and interpret confidence interval estimates for mean, proportion, variance, and standard deviation. g) Calculate the minimum sample size needed for an interval estimate of the mean and proportion h) Summarize properties and characteristics of the Chi-Square distribution i) Identify critical values needed to use the Chi-Square distribution for a CI estimate of the variation
3. Formulate Conclusions Through Inference Using Hypothesis Testing for One Population	<ul style="list-style-type: none"> a) Identify the parts of a hypothesis test and types of tests b) Explain meaning of Type 1 versus Type 2 error c) Discuss the meaning of a p-value d) Formulate a test of hypothesis to answer a question for one population mean, proportion, variance, and standard deviation. e) Interpret the conclusion of a test of hypothesis in the context of an applied problem. f) Calculate and interpret p-values for one sample hypothesis tests.
4. Formulate Conclusions Through Inference Using Hypothesis Testing and Confidence Intervals for Two Populations	<ul style="list-style-type: none"> a) Formulate a test of hypothesis to answer a question comparing the means (independent and dependent cases), proportions, variances, and standard deviations for two populations. b) Interpret the conclusion of a test of hypothesis in the context of an applied problem. c) Construct and interpret a confidence interval estimate for a relevant parameter in a two sample case. d) Calculate and interpret the p-values for 2-sample hypothesis tests. e) Identify critical values using the F-distribution
5. ANOVA	<ul style="list-style-type: none"> a) Implement a test of hypothesis for means from 3 or more populations b) Use software to apply the F test to compare means from three or more populations and interpret the results

	c) Arrange output from an F test into an ANOVA table
6. <i>Contingency Tables</i>	<ul style="list-style-type: none"> a) Construct a Contingency Table for appropriate data b) Apply a Goodness of Fit test c) Apply a Test of Independence if appropriate d) Apply a Test for Homogeneity if appropriate
7. <i>Correlation and Regression</i>	<ul style="list-style-type: none"> a) Construct a scatter plot to assess the relationship between variables b) Use software to calculate the sample correlation coefficient c) Perform a test of hypothesis to assess the significance of the correlation coefficient d) Analyze the appropriateness of the linear model for the data using diagnostic plots on residuals such as a Normal Probability Plot
8. <i>Non-Parametric Statistics (Supplement to OER Texts)</i>	<ul style="list-style-type: none"> a) Apply the Sign Test b) Apply Wilcoxon Signed-rank Test for Matched Pairs