MAT 221/222: Elementary Probability and Statistics I and II

MAT 221/222
Elementary Probability and Statistics I and II
(7 credit sequence)
Class Size: 10-20

Faculty: MAT 221: Hyune-Ju Kim, Professor, Syracuse University
MAT 222: Pinyuen Chen, Professor, Syracuse University
Administrative Contact: Tavish Van Skoik, Assistant Director, Project Advance

Course Catalog Description

MAT 221: First of a two-course sequence. For students in fields that emphasize quantitative methods. Probability, design of experiments, sampling theory, introduction of computers for data management, evaluation of models, and estimation of parameters. Shared Competencies Scientific Inquiry and Research Skills

MAT 222: Continuation of MAT 221. Further methods of statistical analysis emphasizing statistical reasoning and data analysis using statistical software. Basic concepts of hypothesis testing, estimation and confidence intervals, t-tests and chi-square tests, linear regression, analysis of variance. Shared Competencies Scientific Inquiry and Research Skills

Course Overview

MAT 221

MAT 221 is the first in a two-course sequence in statistics for students in academic majors that emphasize quantitative methods. The primary objective of this course is to provide students with knowledge of elementary probability and statistics. Students will learn basic concepts of descriptive statistics, data collection, probability, and random variables in preparation for learning how to use statistical inferences, which will be covered in MAT 222.

1. Distributions – Displaying with graphs, describing with numbers, and normal distributions 2. Relationships – Scatterplots, correlation, and least squares regression 3. Data Collection – Data sources, experimental design, and sampling design 4. Probability – Randomness, probability models, random variables, means and variances, probability rules
5. The Relationship between Probability and Inference – Sampling distributions for counts and proportions, the sampling distribution of a sample mean

MAT 222

MAT 222 builds on the fundamental concepts learned in MAT 221 to develop a working understanding of the use of a variety of inferential techniques. An important component of this course is the data analysis project. In this project, students (typically in teams of two to four) will develop and solve a statistical problem using the methods learned in the course.

1. Introduction to Inference – Confidence intervals, significance tests, use and abuse of tests, power and inference
2. Inference for Distributions – Means and spread
3. Inference for Proportions
4. Inference for Two-Way Variables – Tables

5. Inference for Regression
6. Multiple Regressions
7. One-Way Analysis of Variance
8. Two-Way Analysis of Variance

Pre- / Co-requisites

MAT 221 PREREQ: Algebra competency

MAT 222 PREREQ: MAT 221

Course Objectives

N/A

Laboratory

N/A

Required Materials

Introduction to the Practice of Statistics/CDR, 9th Edition
Moore, McCabe & Craig
Hard Text – ISBN: 9781319013387 (W.H. Freeman Publishers, 888-330-8477, www.whfreeman.com)

MINITAB Release 18 – Windows only (Minitab, Inc., 800-448-3555)
OR
MINITAB Express – Windows or Mac (Minitab, Inc., 800-448-3555)

Instructor Recommendations

N/A