ROWAN UNIVERSITY
Department of Mathematics
Syllabus

STAT 02.284 - Statistics for the Biomedical Sciences

Catalog Description:
STAT 02284: Statistics for the Biomedical Sciences 3 s.h.
Prerequisite(s): MATH 01140 with a grade of C- or higher or MATH 01131 with a grade of C- or better.

This course introduces statistical concepts and analytical methods as applied to data encountered in the biomedical sciences and engineering. It emphasizes the basic concepts of experimental design, quantitative analysis of data, and statistical inference. Topics include probability theory and distributions; population parameters and their sample estimates; descriptive statistics for central tendency and dispersion; hypothesis testing and confidence intervals for means and proportions; categorical data analysis including relative risk, odds ratios, and the chi-square statistic; correlation and simple linear regression.

Objectives:
Statistics for the Biomedical Science is specifically designed to strengthen the biomedical science/ biomedical engineering research competencies and skills of Rowan University students and to help the progress to biomedical research careers. Statistics for the Biomedical Sciences examines many basic techniques of statistics needed by the students and researchers who are majoring in biomedical science/biomedical engineering areas. Greater emphasis will be focused towards the development of critical thinking skills and data analysis applications with computer software.

Content:

Introductory Material:
Statistics in health sciences and biomedical engineering data.
Descriptive methods for categorical data: proportions, ratios, relative risk, odds ratio.
Descriptive methods for continuous data: tabular, graphical method, levels of measurement.

Introduction to probability and probability models:
Concepts of probability.
Normal, binomial, and poisson distribution.

Introduction to confidence intervals (CIs) the mean:
Form a confident interval for mean.
State when it is valid to use this procedure.
Explain what "confidence" means.
Calculate desired sample size

Introduction to hypothesis tests (HTs) through the mean:
P-value, Type I and Type II errors, sensitivity-specificity.
Classical one-sample HTs and relationship to confidence intervals.
Sample size and its effect on inference.

Comparison of population proportions:

Binomial and multinomial models
Classical one- and two-sample CIs
Mantel-Haenszel method
Inference for general two-way tables.
Fisher's exact test, ordered 2Xk contingency tables

Models for Numerical/Quantitative Data:
Simple linear regression, scatter diagram, correlation, estimation, interpretation

Textbook(s)
- *Fundamentals of Biostatistics*. By Bernard Rosner (2016). Cengage Learning-Brooks/Cole, Boston, MA. *ISBN-13: 9781305268920.*
- *Biostatistics A Foundation for Analysis in the Health Sciences* 10th edition By Wayne W. Daniel and Chad L. Cross (2013) *ISBN-13: 9781118302798*
- *Statistics for the Life Sciences* 5th Edition By Myra L. Samuels, Jeffrey A. Witmer, and Andrew Schaffner (2016) *ISBN-13: 978-0321989581*