MATH 4740/MSSC 5740 – Biostatistical Methods and Models

Instructor: Dr. Daniel B. Rowe
Ofice: CU 313
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Ofice Hours: 4:00 – 5:00 PM, Tuesday and Thursday, and by appointment

Course Description:

Introduction to the statistics of life science and the use of mathematical models in biology. Data analysis and presentation, regression, analysis of variance, correlation, parameter estimation and curve fitting. Biological sequence analysis, discrete and continuous mathematical models and simulation. Credit is not given for both MATH 4720 and MATH 4740. Prerequisite: MATH 1400, MATH 1410 or MATH 1450.

Course Learning Objectives:

Students will learn all basic tools of analyzing biostatistical data with fundamentals of testing hypotheses, regression analysis, analysis of variance, and nonparametric inference. About one fourth of the course will be devoted to probability tools for the purpose of biostatistical data analyses. A basis introduction of Bayes rule, sensitivity and specificity, and ROC curve will also be given. Primary focus will on biomedical data and its analyses throughout the course. They will also get familiarity with one of the following statistical software: R, SAS, Minitab, SPSS.

Textbook: Essentials of Biostatistics in Public Health. Author: Lisa M. Sullivan, Publisher: Jones & Bartlett Learning, 4th Edition

Methods of Evaluations:

Student's performance will be evaluated based on homework, mid-term exams, the final exam, class participation, and projects.

Exams: Exam 1: Thursday, February 15, 2024. Chapters 1-4
Exam 2: Thursday, March 21, 2024, Chapters 5-7
Final: Monday, May 6, 2024 10:30 am, Chapters 8-12

Homeworks: Homeworks will be given generally after completing each chapter (due dates will be announced in the class). **Note that the best way you can prepare yourself for the course is by working on the homework problems. So, do the problems independently.**

Grading Policy:

Mid-Term Exam 1:	25 %
Mid-Term Exam 2:	25 %
Homework:	15 %
Class Attendance:	5 %
Final Exam:	30 %

MATH 4740 Scale:

92% - 100% (A)	88% - 92% (A-)	
86% - 88% (B+)	80% - 86% (B)	78% - 80% (B-)
76% - 78% (C+)	70% - 76% (C)	68% - 70% (C-)
66% - 68% (D+)	60% - 66% (D)	56% - 60% (D-)
Lower than 56% (F)		

MSSC 5740: Students in MSSC 5740 will be expected to demonstrate mastery of additional homework assignments, exam questions, and/or projects.

MSSC 5740 Scale:

92% - 100% (A)	88% - 92% (A-)	
86% - 88% (B+)	80% - 86% (B)	78% - 80% (B-)
76% - 78% (C+)	70% - 76% (C)	0% - 70% (F)

Note: There will not be any make-up exam, or homework unless there is an emergency.

Lecture Topics:

0) Introductions & Syllabus
1) Chapter 1 Introduction
2) Chapter 2 Study Designs
3) Chapter 3 Quantifying the Extent of Disease
4) Chapter 4 Summarizing Data Collected in the Sample
5) Chapter 5 The Tole of Probability
6) Chapter 6 Confidence Interval Estimates
7) Chapter 7 Hypothesis Testing Procedures
8) Chapter 8 Power and Sample Size Determination
9) Chapter 9 Multivariable Models
10) Chapter 10 Nonparametric Tests
11) Chapter 11 Survival Analysis
12) Chapter 12 Data Visualization

Computer Usage:

A statistical package will be introduced early and will be used throughout the course. The purpose of the statistical package is for students to familiarize themselves with the use of statistical software in statistical analyses.