

BME 22000: Biomedical Engineering Tools

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Development of tools necessary in biomedical engineering, including statistics, measurement and error, experimental design, graphics and other computational tools, visualization, problem-solving skills, gathering relevant information on interdisciplinary sources from online and library sources, and development of both written and oral technical presentations. Topics will be introduced via real-world biomedical engineering problems.

Prereqs.: Engr 21007; pre- or coreq: Engr 10300, BME 10100. 3 hr./wk.; 3 cr.

Intended outcomes of this course:

Students should learn to:

- a. Apply statistical methods to practical problems.
- b. Understand the design of an experiment.
- c. Analyze and interpret data.
- d. Find and assimilate scientific knowledge quickly.
- e. Work in teams.
- f. Communicate through reports and oral presentations.
- g. Think about the impact of engineering on health and society.

Syllabus:

1. Scientific literature:

Literature search
Structure biomedical papers, engineering papers, technical reports

2. Presentation skills:

Report – Written report on literature search (individual)
Talk – Oral presentation on biomedical implant (individual and group)

3. Graphical representation of data:

Introduction to MATLAB
Plot formats: line, scatter, polar, surface, contour, bar-graph, error bars. etc.
Labeling: title, label, grid, legend, etc.
Statistics: histogram, percentile, mean, variance, standard error, box plot

4. Biostatistics:

Basics of probability
Hypothesis testing, correlation, causality, significance
t-Test, ANOVA
Linear regression, cross-validation
Error analysis
Test power, sensitivity, specificity, ROC analysis

Textbook: Glantz, Primer of Biostatistics, McGraw Hill