Course Description and Aims
This biomedical engineering core course aims to equip students with the practical quantitative methods to analyze and solve biomedical problems. The concepts of hypothesis testing, statistical analysis, and experimental design strategies will be introduced. One major focus of this course is to familiarize students with the statistical programming language R and various statistical tools such as t-test, ANOVA, and regressions. This course also aims to demonstrate how these tools can be appropriately applied to analyze biomedical datasets quantitatively and, in turn, draw conclusions that are justified with numbers.

Teaching Staff
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Reference Materials
- G. Grolemund and H. Wickham. R for Data Science. O'Reilly Media, 2017. [Available online, free, at r4ds.had.co.nz]

Course Learning Outcomes
By the end of this course, students should be able to demonstrate a threshold level of mastery of the following learning outcomes:
1. Form a hypothesis in a biomedical problem and design experiments to collect data
2. Conduct appropriate statistical analyses on data using R to test hypotheses
3. Interpret and present statistical results scientifically

Course Teaching and Learning Activities
This course will be taught in in-person lecturing format. There will be two classes every week, to be held on Mondays and Fridays (10am to 11:20am Eastern time). The tentative course contents for each week are listed below.

| May 2 & 6 | Basic concepts of quantitative methods |
| May 9 & 13 | Parametric test: assumptions and comparison of means |
| May 16, 20 & 27 | One-way analysis of variance (ANOVA) and post-hoc test |
| May 30, June 3 & 6 | Repeated measures one-way ANOVA and factorial ANOVA |
| June 10 | Sample size and statistical power |
| June 13 | Mid-Term |
| June 17 & 20 | Correlation and simple linear regression |
| June 24, 27 & Jul 4 | Multiple linear regression and assumption checking |
| July 8 & 11 | Logistic regression |
| July 15 & 18 | Sensitivity, specificity and receiver operating characteristics |
| July 22 | Reliability and validity |
July 25 & 26: Survival rate and Hazard ratio

Grade Breakdown

Online quiz on LEARN 10%
• Multiple choice questions revisiting the concepts covered in-class
• Due dates: May 20, June 10, July 2, July 22

Problem sets × 2 20%
• Three problem sets to help you practice the statistical methods covered in-class
• Due dates: June 17, and July 29

Mid-term quiz 20%
• Combination of true-or-false questions, multiple choice questions, and statistical analysis questions

Final exam 50%
• Combination of true-or-false questions, multiple choice questions, and statistical analysis questions