

# SYLLABUS: Chemistry 298: Rigor & Reproducibility in Chemical Biology Research

SPRING 2023

Course leader: Professor Peter Beal  
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Lectures: 3:30-5:00pm, MW, Hart Hall, Room 1120

Course Description: This course is designed for first year graduate students or advanced undergraduates in chemistry, biochemistry, bioengineering or allied fields. The focus of this course is to introduce students to rigorous experimental design that ensures reproducibility in the results of research carried out in chemical biology. In addition to an overview of key elements of a rigorous experimental design and statistical analyses, the course will include presentations by UC Davis Chemical Biology Program trainers representing a broad cross section of the chemical biology research carried out on the UC Davis campuses. In each presentation, the trainer will answer the guiding question: “How are experiments designed, carried out and documented in this lab to ensure reproducibility?” This will include a) a description of the design of a “typical” experiment in that lab including a description of key variables, controls etc.; b) a description of the pathway from “raw data” to “figure for a paper” including a description of a typical data acquisition method, any calculations, data fitting and statistical analyses used to define the values to be interpreted and to establish any differences as significant or not; c) a discussion of any unique safety issues that must be considered to carry out this research. d) a discussion of the lab’s data management plan (e.g. note taking, data archive, approach to making data accessible upon request, etc).

Reading materials: Reading materials and homework problems will be posted during the quarter on the course Canvas site. Please check this site regularly.

Learning Objectives: It is expected that upon completion of this course students will be able to recognize rigorous experimental design in chemical biology and have a basic understanding of statistical tests used for data analysis and data management plans.

Grading: This course will be graded pass/fail. Attendance at all sessions is required and will be recorded. Statistics homework problems will be assigned and collected. In addition, a worksheet for each trainer presentation will be provided to be filled out and returned to the course leader.

## Schedule of lectures

Week 1 Wednesday, April 5	Introduction to Rigor and Reproducibility in Chemical Biology-CBP Director <b>Peter Beal</b>
Week 2 Monday April 10	"R <sup>2</sup> and t-test need a rest so learn to choose the best test: Biostatistics 101"-Prof. <b>Elizabeth Neumann</b> , CBP trainer, Department of Chemistry, College of Letters & Science
Week 3 Monday, April 17	Trainer presentation: Prof. <b>Jared Shaw</b> , Department of Chemistry, College of Letters & Science
Week 4 Wednesday, April 26	Trainer presentation: Prof. <b>David Segal</b> , Department of Biochemistry and Molecular Medicine, School of Medicine
Week 5 Monday, May 1	Trainer presentation: Prof. <b>Randy Carney</b> , Department of Biomedical Engineering, College of Engineering
Week 6 Monday, May 8	Trainer presentation: Prof. <b>Igor Vorobyov</b> , Department of Physiology and Membrane Biology, School of Medicine
Week 7 Wednesday, May 17	Trainer presentation: Prof. <b>David Britt</b> , Department of Chemistry, College of Letters & Science
Week 8 Monday, May 22	Trainer presentation: Prof. <b>Marie Heffern</b> , Department of Chemistry, College of Letters & Science
Week 9 Wednesday, May 31	Course wrap-up- <b>Beal</b>