BIOL606 BIOLOGICAL DATA
Spring 2023
Schedule Number 13070 & 13071

COURSE INFORMATION

Class Days / Times: Monday & Wednesday, 2:00pm – 4:20pm

Class Location: LSN-126

Mode: lecture & lab, face-to-face

Platform: Canvas

Instructor: Dr. Nick Barber & Dr. Luke Miller

Preferred pronouns: he/him

Email: nbarber@sdsu.edu , luke.miller@sdsu.edu

Office location: online

Office hours: by appointment

COMMUNICATION

Students may address the instructors as "Luke" and "Nick" in this course, or alternatively "The one with a beard" and "The one who can't grow a beard." Prompt communication about conflicts or concerns in the course is important, and email is the best way to reach us. We generally respond quickly, but we do not guarantee responses during evenings or over the weekend. We often do respond to emails at these times but can't guarantee it, so planning ahead is important.

COURSE MATERIALS

Materials (including texts, readings, course fees, equipment, and any technology requirements)	Required or optional	Where and how it can be obtained
R and RStudio	Required	See welcome announcement
Readings	Required	Distributed through Canvas

ESSENTIAL STUDENT INFORMATION

For essential information about student academic success, please see the SDSU Student Academic Success Handbook.
- Your SDSU email address will be used for all course-related communications.
- The Student Conduct Code prohibits conduct disruptive to instruction, including academic dishonesty and the unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.

- SDSU provides disability-related accommodations via the Student Ability Success Center (sascinfo@sdsu.edu | sdsu.edu/sasc). Please allow 10-14 business days for this process.
- The Family Educational Rights and Privacy Act (FERPA) mandates the protection of student information, including contact information, grades, and graded assignments. I will not post grades or leave graded assignments in public places. Students will be notified at the time of an assignment if copies of student work will be retained beyond the end of the semester or used as examples for future students or the wider public.
- As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I am required to share information regarding sexual violence on SDSU's campus with the Title IX coordinator, Gail Mendez (619-594-6464), who will contact you to let you know about support services at SDSU and possibilities for holding accountable the person who harmed you. If you do not want the Title IX Officer notified, you can speak confidentially SDSU's Sexual Violence Victim Advocate (619-594-0210) or Counseling and Psychological Services (619-594-5220, [psycserv@sdsu.edu)](psycserv@sdsu.edu).
- Class rosters are provided to the instructor with the student's legal name. Please let me know if you would prefer an alternate name and/or gender pronoun.
- Need help finding an advisor, tutor, counselor, emergency economic assistance, or other support? Contact the SDSU Student Success Help Desk Monday through Friday, 9:00 AM to 4:30 PM.
- For technical or computing assistance, contact the Library Computing Hub.

COURSE DESIGN: MAJOR ASSIGNMENTS AND ASSESSMENTS

This is a highly interactive, "advanced" statistics course for MS and PhD students, and course activities and assessments are designed to help students build upon the skills in the prerequisite course BIOL605 (or an equivalent course). Students will complete in-class and homework exercises, analyze data, and present the results of the analyses to the class in the form of professional conference presentations.

This course works best, and students gain the most knowledge, by being prepared and engaged each day. Asking questions benefits every student and helps clarify the topics being covered—if something is unclear to you, there are almost certainly other students with the same questions. Classes are designed with time for questions included, so students are expected to use it. As always, the classroom is a professional environment, and students should participate in a manner that is respectful of other students, the instructor, and other members of our community.

Assessment is based on homework assignments and three presentations to the class. Details on the requirements and format of class presentations will be provided, but the basic requirements are:
- Presentation 1 (Feb 15 & 20, 2023) will be based on an analysis of univariate data with fixed factors.
- Presentation 2 (Mar 13 & 15, 2023) will be based on an analysis of univariate data with fixed and random factors (i.e., a mixed model) or binomial data.

- Final Presentation (Apr 26, May 1 & 3, 2023) will involve a more comprehensive univariate and/or multivariate data and analyses.

Students should begin thinking about appropriate data they could analyze for these presentations. You can use data you already have, obtain it from your advisor, or use data provided by the instructors.

GRADING POLICIES

The final grade will be determined by:

Daily in-class and homework exercises (including peer grading)	150 points
Three in-class presentations (50, 50, & 100 pts)	200 points
Attendance and participation	50 points
	400 points

All homework exercises will be submitted electronically **before** the start of class on the day they are due. Preparing questions based on the homework is highly encouraged, and class time will be dedicated to answering them.

A rubric for presentations will be available on Canvas, and students are encouraged to review it early in the course to better understand the goals of these presentations.

Attendance and participation are expected, and any attendance conflicts need to be communicated as early as possible so alternative and make-up assignments can be determined.

Final grades will be determined by point values: A, >360; B, 320-359; C, 280-319; D, 240-279; F, <240. All students are graded on the same scale, and we do not engage in grade negotiation (that is, students do not get individually "bumped up" when grades are borderline, and requests to do so are inappropriate).

STUDENT LEARNING OUTCOMES

At the end of the course, students will be able to:
- Determine the proper statistical tests given a biological dataset, its properties, and the hypotheses of interest.
- Assess statistical models to determine if they are meeting assumptions correctly.
- Evaluate statistical models to draw conclusions about the data and hypotheses
- Present the results of analyses to peer and colleagues appropriately and professionally.
- Practice data management and analysis using R & RStudio software.

LAND ACKNOWLEDGMENT

For millennia, the Kumeyaay people have been a part of this land. This land has nourished, healed, protected and embraced them for many generations in a relationship of balance and harmony. As members of the San Diego State University community, we acknowledge this legacy. We promote this balance and harmony. We find inspiration from this land, the land of the Kumeyaay.

COURSE SCHEDULE

Date	Topic	Readings	Notes
Jan 18	Intro to class and R	–	Get R & RStudio beforehand
Jan 23	Graphing and visualizing data	Beckerman et al., Ch. 4	
Jan 25	Data Management & Spreadsheets	Broman & Woo 2018	
Jan 30	Data wrangling, t-test	Beckerman et al., Ch. 3	
Feb 1	Review of general linear models	Beckerman et al., Ch. 5 (pp. 93-94, 108-129); Ch. 6 (pp. 145-166)	Midterm #1 datasets due
Feb 6	Generalized linear models, Poisson	Beckerman et al., Ch. 7	
Feb 8	Poisson, continued	–	–
Feb 13	Catch-up & midterm consultations	–	–
Feb 15	Midterm #1 presentations	–	–
Feb 20	Midterm #1 presentations	–	–
Feb 22	Generalized linear models, binomial	Hector, Ch. 9; Farzan & Yang 2018	Check out Farzan & Yang's online supplement too
Feb 27	Linear mixed models 1	Hajduk 2017, McGill 2015	–
Mar 1	Linear mixed models 2	–	–
Mar 6	Linear mixed models 3	–	–

Date	Topic	Readings	Notes
Mar 8	Catch-up & midterm consultations	–	–
Mar 13	Midterm #2 presentations	–	–
Mar 15	Midterm #2 presentations	–	–
Mar 20	Multiple regression I		–
Mar 22	Multiple regression II	–	–
Mar 27	**Spring Break**	–	–
Mar 29	**Spring Break**	–	–
Apr 3	Randomization and bootstrap	Manly Ch. 1	–
Apr 5	Multivariate intro	Gotelli & Ellison Ch. 12, Anderson & Walsh 2013	–
Apr 10	Principal components analysis	Gotelli & Ellison Ch. 12	–
Apr 12	Principal coordinates analysis	Gotelli & Ellison Ch .12	–
Apr 17	Non-metric multidimensional scaling	Clarke & Warwick Ch. 5	–
Apr 19	Redundancy Analysis & CCA	Gotelli & Ellison Ch. 12	–
Apr 24	Catch-up & midterm consultations	–	–
Apr 26	Midterm #3 presentations	–	–
May 1	Midterm #3 presentations	–	–
May 3	Midterm #3 presentations	–	–