

BIOL 7050 Experimental Design Spring 2023

Instructor: Dr. Ansul Lokdarshi  
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Preferred salutation "Dr. Lokdarshi"

Office (Student) hours: Tuesday 9:00 AM – 11:00 AM Thursday 9:00 AM – 11:00 AM  
Or by appointment (please send me an email to my valdosta.edu account with "appointment" in the subject line and I will accommodate as time permits).

Start date Jan 09, 2023 End date May 01, 2023  
Schedule Monday/Wednesday 05:00 PM - 06:15 PM Bailey Science Center Room 2202

***Before reading any more information, please jump to the last page and complete the task.***

Pre-Requisites: MATH 2620 or comparable course, and admission into the graduate program or permission of the instructor. Application of statistical methods to the study of biological problems, with an emphasis on the interaction between the choice of statistical methods and experimental design.

Textbook – Although no specific books are required for this course, I will highly recommend getting the following:

1) The analysis of Biological Data by Whitlock and Schluter (3rd edition); the publisher is W.H. Freeman (Macmillan Learning). This is an excellent introductory textbook, and most of the lecture material will be follow the topics in the book. I have chosen this book because it is easy to read (relative to most statistics texts), it has lots of practice problems, and it does an excellent job at explaining some of the more challenging concepts.

<https://whitlockschluter.zoology.ubc.ca/home/chpt01>

2. Experimental Design for Biologists, Second Edition 2nd Edition by David J. Glass. This handbook explains how to establish the framework for an experimental project, how to set up all of the components of an experimental system, design experiments within that system, determine and use the correct set of controls, and formulate models to test the veracity and resiliency of the data.

*While PowerPoint slides will be posted for course material, students are required to read on their own as the slides may not contain everything discussed in the lectures.*

Course overview: The format will be a combination of lectures, discussion of peer-reviewed articles with primary focus on the experimental design, hands-on data collection and analysis using GraphPad prism statistical software (with graded write-ups), homework assignments and a few unannounced in-class quizzes. There will also be a component of individualized design of an experimental protocol, whether that represents your actual Masters research or other proposed project.

I will post the articles for discussion one week prior to the lecture. You must read the article carefully and be ready to discuss any/all related work in the class. I will monitor the participation for grading. Students in group of two will pick three articles and prepare a PowerPoint presentation for lecture and discussion.

Please don't email me at the end of semester for grade change based on participation.

Topics covered in the course	
Hypothesis-falsification framework	Topics listed represent general outline of the lecture material. Within these topics we will be learning about sub-topics such as the requirement of different types of experimental controls, biological and technical replicates, choice of statistical method for specific type of data, etc.
Question and the Model	
System Validation	
Components of Individual experiments	
Representation of Experimental Data	
Designing Experimental Project	

You will need your personal laptop for installing GraphPad Prism Software. You will be required to bring laptop in every lecture.

Notes on Final Experimental Design Protocol: this will be, essentially, an Introduction and Methods (with partial Literature Cited) of a scientific paper, with emphasis on: 1) justifying your specific hypotheses in the context of your species/system, with preliminary literature review, and 2) specifying the precise methods and all details for sampling, including manipulating explanatory variable(s), measuring effect on response variables, and specific statistical tests needed. Give details of replicates, sample size (do calculations of  $n$  needed for particular power and precision desired), temporal, ecological, spatial scope of study, grain of sampling units, etc. Also specify types of graphs that will be used to display data. Unlike the Methods section of an actually published paper (which is written in past tense), you may write this in future tense, because it is a proposal for what you *will* do.

Attendance policy: Attendance to lecture is required. If you miss a lecture, I reserve the right to determine what constitutes an excused or unexcused absence. Quizzes and in-class assignments will be given throughout the semester, which is why attendance is required. Generally, quizzes or in-class assignments in lecture cannot be made up if lecture is missed. If you miss the lecture and I approved your absence the total number of points possible to you will be reduced. If you miss quizzes and/or in-class lecture assignments and I did not approve the absence a zero will be given for that particular assignment, quiz, etc. *If students must be absent due to a quarantine or isolation requirement for COVID-19, they must report this situation via the COVID Self Reporting Link in MyVSU and through the Dean of Students Office to report any other absences as well.*

#### Cheating or Plagiarism

Incidents of cheating or plagiarism will result in an automatic "F" grade for the course and referral to the Office of Student Conduct for disciplinary action. For the VSU's Academic Integrity Code please see <http://www.valdosta.edu/administration/student-affairs/student-conduct-office/>. For the VSU's Academic Honesty policies and procedure please see <http://www.valdosta.edu/academics/academic-affairs/vp-office/academic-honesty-policies-and-procedures.php>

### Learning Support

Access Office: Students with disabilities who are experiencing barriers in this course may contact the Access Office for assistance in determining and implementing reasonable accommodations. The Access Office is located in Farbar Hall. The phone numbers are 229-245-2498 (V), 229-375-

## Learning contract – Dr. Ansul Lokdarshi

- 1) *I care* – I teach because I want to contribute to your successful career. You must also promise to make the effort to rise to expectations worthy of your own future goals.
- 2) *Knowledge ownership* – “You can lead a horse to water, but you can’t make him drink”. I try really hard do three things to lead students to knowledge. A) I select only the most important topics. B) I organize the topics so each lecture builds on previous ones. C) I include current and personal details to make the class relevant, interesting, and cutting edge. This effort is lost on students who expect proficiency to come from little more than simply listening to lectures and last-minute cramming. Your success is proportional to your amount of effort and review.
- 3) *Self-motivation* – College is not an extension of a kid’s legally-required high-school education. It is an adult’s entry into the job market. The distinction is important because your future career job application will hinge on your college transcript. Your peer competition understands this and is doing all he or she can to out-perform you. I try hard to motivate you, but ultimately, good grades only go to students with high internal drive.
- 4) *Synthetic thinking* – A fancy way of saying “make connections”. I will give you new conceptual “tools”, so become a tool user. Own your newfound knowledge and use it to understand your world. If you come across something that’s peripherally related to class material, ask questions about it. You can’t help but become motivated when you’re mentally engaged.
- 5) *Honesty and integrity* – Do not cheat. People who care about you, including me, expect more from you than that. I punish cheaters to the fullest extent allowed by the Student Code and in the future, it is tough explaining why you should be given the job or admitted to grad school when your transcript has an F because you got caught plagiarizing or palming a crib note.
- 6) *Participate!* – Have a question? Ask it! Here is a universal truth: if you have a question, chances are good that someone else is wondering the same thing. You’re not alone and I will never, ever belittle you for trying to learn. It makes for engaged learning and who knows, maybe your question unlocks a fundamental concept that half of the final exam questions are about. My deal for shy people: I won’t pick on you if you promise not to keep questions bottled up.
- 7) *Email etiquette* – Emails lack non-verbal cues and often lead to unintended consequences. As such, I require you to email me using standard formal etiquette: A) Include a salutation, (e.g. Dear Dr. X or Hello Prof. X, not Hey), B) follow this by a complete description of your question/message and your course/section information, and C) always sign off using a complementary closing and your name/ID number. **I do not respond to emails that do not have all these components. Use your VSU email address; others are often blocked by our inbox system.**
- 8) *Start early* – This class is fast moving, and builds on itself; there is no time later to catch up. If you miss a class, it is up to you contact me to see what can be done within a week. Otherwise, you will get a zero for that grade.
- 9) *Priorities* – In signing this, you have made the commitment to learn. It is a priority that is similar to that of a paying job. To teach you effectively, I require you to show up on time, to be mindful of the above points and be respectful to me and your fellow students.

I have read and understand these crucial tips for success:

Name \_\_\_\_\_

Date \_\_\_\_\_

Class and Section \_\_\_\_\_

**After signing, scan and upload a copy to the assignment folder in BV.**