Applied Regression and Design of Experiments, 3 credits

ABE6933 section ARDE, course # 27558 (sync), section ARLD #27559 (async), section ARDR #28660 (REC)
Class Periods: Tuesdays and Thursdays, periods 7-8 (1:55-3:50 PM)
Location: online sync (enroll in ARLD only if you have a minor schedule conflict with ARDE)
Academic Term: Fall 2025

Instructor:
Dr. Nikolay Bliznyuk
Email: nbliznyuk@ufl.edu
Phone: 352-392-1864 (only by prior appointment)
Office Hours: office hours by Zoom, times TBA in class

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
To be announced in class

Course Description
This course focuses on applied regression and design of experiments. It is designated as the second graduate course in statistical methods in research for non-statisticians. The course emphasizes implementation and application of statistical methods as opposed to the derivations and justification of the procedures. R will be the statistical computing environment of choice. Subject to popular demand, Python may also be explored (in addition to R), but this is not a requirement for students trained in R.

Course Pre-Requisites
a recent first graduate statistical methods class (such as STA6093 or STA6166); experience reading and writing simple computer programs or scripts in a scripting language (ideally, in R)

Course Objectives
- Learn and be able to implement in R (or Python) different flavors of regression
- Learn the principles behind and application of different types of statistical designs
- Learn to meaningfully manipulate the output of functions from statistical libraries for regression
- Learn to use R/Python as a statistical computing environment – for statistical inference, prediction, scientific computing and data visualization

Materials and Supply Fees
None

Required Textbooks and Software
No textbooks are required. Lecture notes and slides will be distributed in advance.
R/Python languages and appropriate computing environments (e.g., R Studio/Anaconda) are freely available

Recommended Materials
Will be announced in class if needed

Required Computer
Recommended Computer Specifications: https://it.ufl.edu/get-help/student-computer-recommendations/

Course Schedule
Tentative list of topics
- Multiple Linear Regression
- Analysis of Covariance
- Factorial Designs (Fixed, Mixed, Random Effects)
- Nested Designs
- Split-Plot Designs

- Repeated Measures Designs
- Generalized Linear Models (Logistic Regression, Poisson Regression)
- Linear and Generalized Linear Mixed Models (LMMs and GLMMs)
- Nonlinear Regression
- Semiparametric Regression and Generalized Additive Models
- High-dimensional inference and multiple testing

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework	100 each	50%
Midterm Exam (take home)	100	20%
Project (take home)	100	30%
		100%

Homework will be assigned regularly and will/may be reinforced with quizzes. Project (requiring about 40 hours to complete) will consist of a proposal (10 pts), report (60 pts) and presentation (30 pts). Tentative project details are provided in the Supplements at the end of the syllabus and will be refined during the first month of the class.

Grading Policy

Tentatively, the following grading scale will be adopted; grades may be curved to the advantage of students.

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu

SUPPLEMENTS: Project description

The project will emphasize creative application of the methods/knowledge developed in the course. Ideally, the application would be to your line of research and data (your own or of your immediate collaborators - advisor or fellow students). If you do not have suitable data, please check out the sources at the end of this description for the publicly available datasets. Otherwise, a good project could be a replication and extension of the results of a methodological paper of interest (select papers may be provided, or you may propose your own). "Creative application" does not allow merely running someone else's code without making other contributions. **Plagiarism is totally inappropriate and prohibited (just do not do it); it will result in a failing grade for the course. Course staff will run all project reports through UF Ithenticate. All work should be done individually (unless explicitly permitted by the instructor – for more ambitious projects).** *Projects already completed for other classes/causes are not acceptable. Example 1 - unacceptable: in a previous semester, a student wrote a paper for a journal or did a project for a different class, and now wants to submit it without major changes or additional relevant work as the class project. Example 2 – acceptable: in a previous semester, a student wrote a paper for a journal or did a project for a different class, but wants to do a major extension of the work using the techniques learned in this class. This would make a potentially very good project, but the student needs to be explicit about what is new and what not. Only the new work will constitute the course project in this case.* The project will be used to assess the knowledge and skills that students acquired in the course; for that reason, the work must be done individually and without assistance from the course staff.

Deliverables: a one-page proposal, a short technical report as described below, and a 10-12 minute presentation during the last week of classes followed by 3-5 minutes of questions.

Deadlines: (very tentative; will be revised appropriately each year)

(TBA; tentatively, 01-Nov): submit your proposal by email to the instructor, so that we can meet asap (individual slots TBA after your proposals have been received and reviewed).

(TBA; tentatively, last week of classes): project presentations (as appropriate)

(TBA; tentatively, 10-Dec): final report (in pdf format, accompanying code and the actual data that you used, if using a publicly available source; put all in a folder named after you and create a zip or rar archive; test archive before submitting), submit using Dropbox file request – link to be provided in class.

Expectations for the proposal (1 page):

The main goal behind the proposals is to ensure that the projects are neither too simple nor too ambitious (i.e., will require about 40 hours to complete – loosely, an equivalent of 4-5 weeks of homework effort, where writing will play a significant role), there is no duplication among students and that you have the necessary relatively clean data to analyze. Please specifically discuss what you propose to do (e.g., "big picture" and specific methods), why you focus on this particular problem (significance, motivation and relevance to the course) and available data (specifically, what are primary response variable(s) and features, what are n and p, etc). Your project should be "shovel ready", i.e., a bit of data preprocessing may be necessary but you should not be spending more than 20% (ideally, 10%) of your total time budget on cleaning and data manipulation. The typesetting format of the proposal should be the same as for the project (please read below).

Expectations for the report (8 pages):

Report should be organized as a short paper appropriate to your field; e.g., a short abstract (100 words), intro (including motivation), background and data, methods, analysis/results, conclusions/discussion. *Any software/languages/environments may be used for the project (i.e., not necessarily R).* The length is about 8 pages (not counting references, appendices or supplements) double-spaced, using 12 pt font: roughly 6 pages of text and 2 pages for your most essential tables and figures; **single-column only**. If necessary, the paper may have an Appendix with additional figures and tables. Data, code and other supplemental information should be made available as part of "Supplementary Materials" unless the data are confidential (please discuss "deliverables" in the proposal). Please check out the project evaluation rubric in a separate file.

Expectations for the presentation:

Presentation should reflect a typical conference-style contributed talk (based on a short deck of slides that a student would prepare) that runs for 10-12 minutes, potentially followed by 3-5 minutes of questions/discussion. Depending on the year and the course, these would be either recorded in advance (by a student) or delivered synchronously. Regardless of the format, the presentations emphasize "live speech" rather than reading from a prompt.