

**University of Florida**  
**College of Public Health & Health Professions Syllabus**  
**PHC 6937: Applied Longitudinal Data Analysis (3 credit hours)**  
Spring: 2024  
Delivery Format: On campus  
E-Learning: [elearning.ufl.edu](http://elearning.ufl.edu)

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Course Hours: Mondays 8:30-9:20 and Wednesdays 8:30-10:25  
Office Hours: By appointment  
Preferred Course Communications: e-mail via Canvas

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Prerequisites: Courses in introductory statistics as well as linear and generalized linear model regression. Familiarity with matrix multiplication and with the statistical package R. R is freely available at <http://cran.r-project.org/>.

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## **PURPOSE AND OUTCOME**

### **Course Overview**

Concepts and methods for longitudinal data analysis based on randomized trials and observational studies.

### **Relation to Program Outcomes**

This course serves the knowledge and skills student learning objectives by preparing students to communicate the underpinning of biostatistics concepts and methods and to apply biostatistical concepts and methods on one's own, including interpretation and communication of results.

### **Course Objectives and/or Goals**

Upon successful completion of the course, students should be able to:

- Formulate and explain assumptions required for longitudinal data analysis based on randomized trials or observational studies.
- Use summary measure analysis and response profiles to analyze the data
- Apply theory, methods, and computation for analysis with linear models
- Apply theory, methods, and computation for analysis with generalized linear models
- Apply theory, methods, and computation for analysis with linear and generalized linear mixed effects models
- Apply theory, methods, and computation for analysis with marginal models using generalized estimating equations
- Become acquainted with fixed effects models for longitudinal data analysis
- Apply theory, methods, and computation for longitudinal data analyses with missing data

### **Instructional Methods**

Lectures with slides, data analysis demonstrations in R and SAS, and discussions. Homework assignments for each chapter and two takehome exams.

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## DESCRIPTION OF COURSE CONTENT

### Topical Outline/Course Schedule

1. Introduction: Basic Concepts, Data Examples (Jan 6,11)
2. Notation and Historical Methods, including Summary Measure Analysis (Jan 13)
3. Estimation and Statistical Inference (Jan 18)
4. Response Profiles and Parametric Curves (Jan 20, 25)
5. Modeling the Covariance (Jan 27, Feb 1)
6. Linear Mixed Effects Models (Feb 3, 8)
7. Fixed Effects Models (Feb 10, 15)
8. Residual Analyses and Diagnostics (Feb 17, 22)
9. TAKEHOME EXAM 1: Handed out Feb 22, Return Mar 3
10. Review of Generalized Linear Models (Feb 24, Mar 1, 3)
11. SPRING BREAK: March (8,10)
12. Marginal Models and Generalized Estimating Equations (Mar 15, 17, 22)
13. Generalized Linear Mixed Effects Models (Mar 24, 29, 31)
14. Contrasting Marginal and Mixed Effects Models (Apr 5, 7)
15. TAKEHOME EXAM 2: Handed out April 7, Return Apr 14
16. Missing Data and Dropout: Overview of Concepts and Methods (Apr 12)
17. Missing Data and Dropout: Applying Multiple Imputation and Weighting Methods (Apr 14, 19)

### Course Materials and Technology

Required text: *Applied Longitudinal Analysis, Second Edition (2011)*, by Garrett M. Fitzmaurice, Nan M. Laird, and James H. Ware, Hoboken, NJ: John Wiley & Sons.

Additional Course Materials Available via E-Learning at [elearning.ufl.edu](http://elearning.ufl.edu)

For technical support for this class, please contact the UF Help Desk at:

- (352) 392-HELP - select option 2
- <https://elearning.ufl.edu>

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## ACADEMIC REQUIREMENTS AND GRADING

### Assignments

Students are expected to be actively involved in each class, including sharing comments of required reading, discussing answers and questions to homework assignments, and participating in class discussion.

The overall grade will include homework, class participation and two in-class exams. Class participation will include weekly attendance, sharing reading comments, and leading and participating in discussion. Students are encouraged to discuss either in groups or with the instructor on homework assignments.

Class participation: 10%

Homework: 30%

Exam 1 (mid-semester): 30%

Exam 2 (final week of classes): 30%

The grading scale for this course consists of the standard scale, including minus grades, below. Percentages will be rounded to the nearest grade.

93% - 100% = A

90% - 92% = A-  
 87% - 89% = B+  
 83% - 86% = B  
 80% - 82% = B-  
 77% - 79% = C+  
 73% - 76% = C  
 70% - 72% = C-  
 67% - 69% = D+  
 63% - 66% = D  
 60% - 62% = D-  
 Below 60% = E

Please be aware that a C- is not an acceptable grade for graduate students. A grade of C counts toward a graduate degree only if an equal number of credits in courses numbered 5000 or higher have been earned with an A.

Letter grade to grade point conversions fixed by UF:

| Letter Grade | A   | A-   | B+   | B   | B-   | C+   | C   | C-   | D+   | D   | D-   | E   | WF  | I   | NG  | S-U |
|--------------|-----|------|------|-----|------|------|-----|------|------|-----|------|-----|-----|-----|-----|-----|
| Grade Points | 4.0 | 3.67 | 3.33 | 3.0 | 2.67 | 2.33 | 2.0 | 1.67 | 1.33 | 1.0 | 0.67 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

For greater detail on the meaning of letter grades and university policies related to them, see the Registrar's Grade Policy regulations at:

<http://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### Exam Policy

The two exams and the homework are takehome. Students are bound by the UF honor code (see below) and may neither give nor receive aid on the exams. Students may not share exams or homework or solutions with anyone outside the course at any time, even after the course is finished.

### Policy Related to Make up Exams or Other Work

In the event of unusual circumstances, a student could receive an extension of the due-date to a take-home exam or an incomplete grade in the course.

### Policy Related to Required Class Attendance

Attendance of all online sessions is expected. Exceptions will be granted with the expectation of watching the video recordings of the online classes missed. We will follow the UF Attendance Policy.

For information regarding the UF Attendance Policy see the Registrar website for additional details:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

## STUDENT EXPECTATIONS, ROLES, AND OPPORTUNITIES FOR INPUT

### Expectations Regarding Course Behavior

Students are expected to show up for each online class prepared and on time. Students should mute their microphones in the event of external noise.

### Communication Guidelines

Students are expected to participate in class discussions. Assignments must be clearly written in reasonably good English.

### Academic Integrity

Students are expected to act in accordance with the University of Florida policy on academic integrity. As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge:

**“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.”**

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied:

**“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”**

It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For additional information regarding Academic Integrity, please see Student Conduct and Honor Code or the Graduate Student Website for additional details:

<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>  
<http://gradschool.ufl.edu/students/introduction.html>

Please remember cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

### **Online Faculty Course Evaluation Process**

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

## **SUPPORT SERVICES**

### **Accommodations for Students with Disabilities**

If you require classroom accommodation because of a disability, you must register with the Dean of Students Office <http://www.dso.ufl.edu> within the first week of class. The Dean of Students Office will provide documentation of accommodations to you, which you then give to me as the instructor of the course to receive accommodations. Please make sure you provide this letter to me by the end of the second week of the course. The College is committed to providing reasonable accommodations to assist students in their coursework.

### **Counseling and Student Health**

Students sometimes experience stress from academic expectations and/or personal and interpersonal issues that may interfere with their academic performance. If you find yourself facing issues that have the potential to or are already negatively affecting your coursework, you are encouraged to talk with an instructor and/or seek help through University resources available to you.

- The Counseling and Wellness Center 352-392-1575 offers a variety of support services such as psychological assessment and intervention and assistance for math and test anxiety. Visit their web site for more information: <http://www.counseling.ufl.edu>. On line and in person assistance is available.
- You Matter We Care website: <http://www.umatter.ufl.edu/>. If you are feeling overwhelmed or stressed, you can reach out for help through the You Matter We Care website, which is staffed by Dean of Students and Counseling Center personnel.
- The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: <https://shcc.ufl.edu/>
- Crisis intervention is always available 24/7 from:

Alachua County Crisis Center  
(352) 264-6789

<http://www.alachuacounty.us/DEPTS/CSS/CRISISCENTER/Pages/CrisisCenter.aspx>

Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

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