Tufts University, Friedman School of Nutrition Science and Policy
NUTR 309: Statistical Methods for Nutrition Research II
Spring 2017

Class Meetings: Monday, 1:30-3pm, Jaharis 118: Lecture
Thursday, 1:30-3pm, Sackler 514: Computer lab

Exception: 2/23 in Jaharis 118

Instructor: Farzad Noubary, PhD
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Teaching Assistant: Kerry Criss
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Office hours: TBD

Graduate Credits: 1.0
Prerequisites: **NUTR 0206: Biostatistics I**

Course Description: This course examines statistical methods for nutrition research, focusing on regression methods for continuous, binary, count and survival data. Emphasis is on developing a conceptual understanding of the application of these techniques to solving problems and to cogently summarize the results, rather than numerical details.

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

- Analyze continuous outcomes using multiple linear regression models
- Use logistic regression to investigate and test associations with binary outcomes
- Apply survival modeling methods for censored and time-to-event analyses
- Apply Poisson modeling methods for count data
- Use statistical software (R) to analyze data

Texts or Materials: - Regression Methods in Biostatistics: Linear, Logistic, Survival, and Repeated Measures Models (2nd Edition), by Eric Vittinghoff et al (Springer 2012) (ISBN-10: 1461413524). *Required.*

This book is available electronically through the Tufts Library:
http://link.springer.com.ezproxy.library.tufts.edu/book/10.1007%2F978-1-4614-1353-0

- Introductory Statistics with R (Statistics and Computing) (2nd Edition), by Peter Dalgaard (Springer 2008) (ISBN-10: 9780387790534).
Suggested.
This book is available electronically through the Tufts Library:
http://link.springer.com.ezproxy.library.tufts.edu/book/10.1007%2F978-0-387-79054-1

- Lecture notes and other material will be posted on Trunk.

Academic Conduct: Each student is responsible for upholding the highest standards of academic integrity, as specified in the Friedman School's Policies and Procedures manual (http://nutrition.tufts.edu/student/documents) and Tufts University policies (http://students.tufts.edu/student-affairs/student-life-policies/academic-integrity-policy). It is the responsibility of each student to understand and comply with these standards, as violations will be sanctioned by penalties ranging from failure on an assignment and the course to dismissal from the school.

Classroom Conduct:
- Attend all classes and statistical computing lab sessions.
- Read assigned materials prior to class and actively participate in class discussions.
- Demonstrate an understanding of the use of statistics on assignments, quizzes, and examinations.
- Demonstrate the ability to use statistical programming in analyzing data.

Assessment and Grading: Grading basis is letter grade which includes:

Class Participation.....	5%
Homework (n=5).....	30%
Quizzes (n=2).....	40%
Final Project.....	25%

Assignments and Submission Instructions: Homework is due at 5:00 PM on the given date. Late assignments will not be accepted without advance permission of Dr. Rodday. Although you may work with others on homework assignments, your handed-in assignments must represent your own work.

Final Project: The final project will be an individual data analysis project using a dataset provided by the instructors. You may use any course materials or other resources, but may not work with or consult with other students. The project will be assigned on Monday, 4/10/17 and due on Thursday, 5/11/17 at 11:59 pm.

Accommodation of Disabilities:
Tufts University is committed to providing equal access and support to all students through the provision of reasonable accommodations so that each student may access their curricula and achieve their personal and academic potential. If you have a disability that requires reasonable accommodations please contact the Friedman School Assistant Dean of Student Affairs at 617-636-6719 to make arrangements for determination of appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively, making timeliness a critical aspect for their provision.

Course Schedule:

Week	Date	Topic	Assignments
Week 1	Thur, 1/19	Review of Biostatistics I	
Week 2	Mon, 1/23	Multiple Linear Regression I	
	Thur, 1/26	Computer Lab	Homework 1 assigned
Week 3	Mon, 1/30	Multiple Linear Regression II	
	Thur, 2/2	Computer Lab	Homework 1 due
Week 4	Mon, 2/6	Multiple Linear Regression III	
	Thur, 2/8	Computer Lab	Homework 2 assigned
Week 5	Mon, 2/13	Sample Size and Power	
	Thur, 2/16	Computer Lab	Homework 2 due
Week 6	Mon, 2/20	PRESIDENTS' DAY—No lecture	
	Thur, 2/23	(Monday's schedule, Jaharis 118) QUIZ 1	
Week 7	Mon, 2/27	Logistic Regression I	
	Thur, 3/2	Computer Lab	Homework 3 assigned
Week 8	Mon, 3/6	Logistic Regression II	
	Thur, 3/9	Computer Lab	Homework 3 due
Week 9	Mon, 3/13	Survival Analysis I	
	Thur, 3/16	Computer Lab	Homework 4 assigned
Week 10	Mon, 3/20	SPRING BREAK—No lecture	
	Thur, 3/23	SPRING BREAK—No lab	
Week 11	Mon, 3/27	Survival II	
	Thur, 3/30	Computer Lab	Homework 4 due
Week 12	Mon, 4/3	Survival III	
	Thur, 4/6	Computer Lab	
Week 13	Mon, 4/10	Longitudinal Analysis I	FINAL PROJECT ASSIGNED
	Thur, 4/13	Computer Lab	Homework 5 assigned
Week 14	Mon, 4/17	PATRIOTS' DAY—No lecture	
	Thur, 4/19	QUIZ 2	
Week 15	Mon, 4/24	Longitudinal Analysis II	
	Thur, 4/27	Computer Lab	Homework 5 due
Week 16	Mon 5/1	Longitudinal Analysis III	
	Thur, 5/3	READING PERIOD—No lab	
Week 17	Mon, 5/8	Longitudinal IV	
	Thur, 5/11	Computer Lab	FINAL PROJECT DUE

***** This schedule is subject to modification at the instructor's discretion.

Course Topics, Learning Objectives and Assignments*

Week 1: Review
Learning objectives: Review methods from Biostatistics 1, including linear regression
Reading: Vittinghoff Chapter 4.1 – 4.3, 4.7

Week 2: Multiple Linear Regression I
Learning objectives: Explain methods for controlling for confounding and interaction in a statistical model
Reading: Vittinghoff Chapter 4.4-4.6
Assignments: Homework 1 assigned

Week 3: Multiple Linear Regression II
Learning objectives: Partial F-tests and correlation coefficients, collinearity, maximum likelihood.
Assignments: Homework 1 due

Week 4: Multiple Linear Regression III
Learning objectives: Describe and contrast different multivariate model building techniques
Reading: Vittinghoff Chapter 10
Assignments: Homework 2 assigned

Week 5: Sample Size and Power
Learning objectives: Conduct sample size and power calculations
Reading: Vittinghoff Chapters 4.8 (required), 5.7 (optional)
Assignments: Homework 2 due

Week 6: Quiz 1 on 2/23 (No class on 2/20 for Presidents' Day)

Week 7: Logistic Regression I
Learning objectives: Fit univariate and multivariate logistic regression models
Reading: Vittinghoff Chapters 5.1 – 5.2
Assignments: Homework 3 assigned

Week 8: Logistic Regression II
Learning objectives: Discuss settings where case-control studies may be appropriate and assess logistic regression model fit
Reading: Vittinghoff Chapters 5.3 – 5.4
Assignments: Homework 3 due

Week 9: Survival Analysis I
Learning objectives: Summarize time-to-event data, including right censoring and Kaplan-Meier plots
Reading: Vittinghoff Chapters 3.5.1 – 3.5.3
Assignments: Homework 4 assigned

Week 10: SPRING BREAK

Week 11: Survival Analysis II

Learning objectives: Conduct log-rank tests, fit Cox proportional hazards models
Reading: Vittinghoff Chapters 3.5.4, 3.5.6, 6.1-6.2
Assignments: Homework 4 due

Week 12: Survival Analysis III
Learning objectives: Assess Cox model fit, propose models with time-dependent covariates
Reading: Vittinghoff Chapters 6.3, 6.4
Assignments: Homework 3 due

Week 13: Longitudinal Analysis I
Learning objectives: Introduce analysis strategies for longitudinal data
Reading: Vittinghoff Chapters 7.1-7.3
Assignments: Homework 5 assigned

Week 14: Quiz 2 on 4/19 (No class on 4/17)

Week 15: Longitudinal Analysis II
Learning objectives: Discuss strengths and limitations of the analysis of response profiles
Reading: Vittinghoff Chapters 7.4
Assignments: Homework 5 due

Week 16: Longitudinal Analysis III
Learning objectives: Fit random effects models
Reading: Vittinghoff Chapters 7.5-7.12

Week 17: Longitudinal Analysis IV
Learning objectives: Interpretation of results of random effects models; assessment of model fit

***** This schedule is subject to modification at the instructor's discretion.

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