

CLRES 2022 Syllabus

Course Description and objectives: This course is designed for medical researchers with non-biostatistics majors. The course will focus on the basic concepts and the use of logistic regression models. At the end of this course, a student should be able to:

- recognize the multivariable problem addressed by logistic regression in terms of the types of variables considered;
- assess the relationship of risk factors and a categorical outcome using a logistic regression model;
- compute and interpret estimated risk of developing a disease or an odds ratio from a fitted logistic regression model;
- understand the limitation in the estimation when different study design is used;
- develop analytic skills through the analysis of data sets taken from the fields of medicine and public health; and
- develop oral and written communication skills through the description of analytic strategies and the summarization and interpretation of results.

INSTRUCTORS

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TEACHING FELLOW

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MEETING TIMES & LOCATION

October 1 – October 27, 2008

MW 1:00pm – 3pm

200 Meyran Ave., Suite 220 (Parkvale Building Computing Lab)

Credits: 1 credit (16 total contact hours; 4 contact hours/week for 4 weeks)

Grading: Letter grade based on

- 60% Homework assignments
- 20% Take-home final project
- 10% Final exam
- 10% Class participation and attendance

Required Text

Kleinbaum, DG and Klein M. *Logistic Regression: A Self-Learning Text, 2nd Edition*. New York: Springer (2002).

This book is available at the CRTP library (contact Jen Kush for details).

Additional references

Hosmer DW and Lemeshow S. *Applied Logistic Regression, 2nd Edition*. New York: Wiley (2000).

Long JS and Freese J. *Regression Models for Categorical Dependent Variables Using Stata, 2nd Edition*. College Station, Texas: Stata Press (2006).

Vittinghoff E, Glidden DV, Shiboski SC, McCulloh CE. *Regression Methods in Biostatistics: Linear, Logistic, Survival, and Repeated Measures Models*. New Yor: Springer (2005).

Computing Package: Stata 10, Stata Press, College Station, Texas (www.stata.com)

Problem Sets: The homework assignments are essential in learning the concepts of logistic regression. Trainees are encouraged to discuss and work together about difficult problems, but all trainees must write their own solutions.

Homework 1: due 10/13

Homework 2: due 10/20

Homework 3: due 10/27

LATE HOMEWORK ASSIGNMENTS: Students will be assigned written exercises that will be graded. All homework assignments will be assigned with a due date. Late homework assignments will be penalized 10% per day over the due date unless prior arrangements have been made with the instructors.

Final Exam: There will be a final exam on the last day of class consisting of short answer and multiple choice questions.

Final Project (assigned October 27, 2008; due November 10, 2008): Trainees must work on the final project **independently**. Discussion, consulting, or working with other people is **not** permitted.

Academic Integrity: Students in this course will be expected to comply with the [University of Pittsburgh's Policy on Academic Integrity \(http://www.provost.pitt.edu/info/ai1.html\)](http://www.provost.pitt.edu/info/ai1.html). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

Disabilities: If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and the [Disability Resources and Services \(http://www.drs.pitt.edu/policies.html\)](http://www.drs.pitt.edu/policies.html) no later than the 2nd week of the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. To notify Disability Resources and Services, call 648-7890 (Voice or TTD) to schedule an appointment. The Office is located in 216 William Pitt Union.

Incomplete grades: Students who are unable to complete the course for any reason must contact the course instructor as soon as possible to discuss grades and remediation [course reasons ("I" incomplete), extenuating personal reasons ("G" incomplete), withdrawal ("W")]. Students will have one calendar year from the start of the course to complete the course requirements, otherwise an "I" or "G" grade will remain on the transcript.

SESSIONS

Wednesday, October 1, 2008

Lecture 1: Introduction to Logistic Regression

Text reference: Kleinbaum & Klein Ch 1 & Ch 4

- Overview of course
- Introduction to logistic regression
- Maximum likelihood estimation
- One sample estimation

Monday, October 6, 2008

Lecture 2: Logistic Regression Models I

Assignment: Homework 1

Text reference: Kleinbaum & Klein Ch 2-3

- Odds ratios without regression
- Logistic regression model
- Continuous predictors
- Hypothesis testing
- Covariate adjustment

Wednesday, October 8, 2008

Lecture 3: Logistic Regression Models II and Model Selection

Text reference: Kleinbaum & Klein Ch 6-7

Supplemental: Hosmer & Lemeshow Ch. 4

- Likelihood ratio tests
- Predicted probabilities
- Interactions and centering covariates
- Model selection

Monday, October 13, 2008

Lecture 4: Regression Diagnostics

Assignment: Homework 2

Text reference: Vittinghoff et al, pages 188-195 (Checking Model Assumptions)

- Overall fit
- Individual fit
- Multicollinearity
- Functional form of covariates

Wednesday, October 15, 2008

Lecture 5: Case-Control Studies

Text reference: Kleinbaum & Klein Ch 8

- Overview of case-control and cohort studies
- Measure of association
- Estimating risk
- Matched case-control studies
- Conditional logistic regression

Monday, October 20, 2008

Lecture 6: Prediction and Multinomial Logistic Regression

Assignment: Homework 3

Text reference: Kleinbaum & Klein Chapters 9 & 10

Supplemental reading: Vittinghoff et al, pages 180-183 and 201-203

Hosmer & Lemeshow § 8.1-8.2

- Classification
- ROC analysis

- Multinomial logistic regression

Wednesday, October 22, 2008

Lecture 7: Models for Correlated Binary Data, Sample Size Planning, Class Review

Required reading: Kleinbaum & Klein Ch 11-13

Supplemental reading: Hosmer & Lemeshow § 8.3

- Correlated binary data
- Generalized estimating equations
- Generalized mixed effects models
- Sample size planning
- Class overview

Monday, October 27, 2008

Lecture 8: Final Exam, Examples in the Literature, Review of Project

Required reading: Case studies from literature