Advanced Quantitative Methods for Health Care Professionals
PUBH 742 – Spring 2016 (Updated 01/26/16)

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Class Notes: Copies of the class lecture slides are posted on Sakai under “Course Documents” and “PUBH 742 Lectures”; you may want to print them off to bring to class. You will get the most out of the lectures if you read the notes before class — the pace of the class is fast. It’s difficult to know exactly how much material will be covered in each class. The assigned pages for each lecture are usually correct, but sometimes we will cover more or less material than indicated.

There are lecture notes from PUBH 741 that will help you to review, particularly if you missed any of these lectures. These will be listed in the syllabus and are available on Sakai in “Course Documents” in a folder called “PUBH 741 Lectures”.

Several articles are posted on Sakai. Many of these are suggested readings, but enhance topics in the lectures and/or make good references.

Suggested Texts: (not necessary for class, but you may want to have as references)


Class Location: 132 McNider

Class Schedule:

Thursday 11:50–1:45
Friday 10:10–12:05

Course Work:

Problem Sets – Assignments 1-5 to be completed and a hardcopy turned in at the end of each problem set session. It’s okay to help each other out, particularly if you are stuck on a concept or a Stata command, but you will learn best if you do as much of the work on your own as possible. Final write-ups should be done independently. There will be no final exam.

Problem Set Sessions: These sessions will be used to discuss answers to problem sets, as well as any other questions. There is 1 problem set on exploratory data analysis, 3 on logistic regression, and 1 on survival analysis.

Additional Links (Stata Resources, lectures, etc.):

www.stata.com (main website for Stata)
www.ats.ucla.edu/stat/stata/ (UCLA site with helpful Stata information and tutorials)
http://www.cpc.unc.edu/research/tools/data_analysis/statatutorial/index.html (Carolina Pop. Ctr.)
www.pitt.edu/~super1 (Supercourse lecture repository; WHO Collaborating Center, Pittsburgh)

March 19, 2016
Syllabus – 2016

Part 1: Sampling and Sample Size  [Note: Part 1 will be covered starting on 04/15]

Part 2: Exploratory Data Analysis

Thurs 1/14
PUBH 742 Course Overview

Review of PUBH 741 exam – Bring a copy of your final exam and the example solutions to class (the example solutions are posted on Sakai for PUBH 742 under “Course documents”)

Exploratory Class 1
Topics: Continuous variables (univariable)
Lecture notes: pp. 2.1.1–2.1.17 [slides: Part 2\Explore1]

Fri 1/15 – Exploratory Class 2
Topics: Continuous variables (bivariable); Categorical variables (univariable, bivariable)
Lecture notes:
  PUBH 741 Review: Categorizing continuous X variables [“PUBH741-Part5.pdf”; pp. 5.13–5.50];
  Transforming X variables [“PUBH741-Part5.pdf”; pp. 5.63–5.98]
  PUBH 742 notes: pp. 2.1.18–2.1.68 [slides: Part 2\Explore1]

Thurs 1/21 – Exploratory Class 3
Topics: Influential data points; Collinearity; Missing data; Confounding
Lecture notes: pp. 2.2.1–2.2.37; 2.3.1–2.3.4 [slides: Part 2\Explore2, Explore3]
(Note: Skip slides 2.2.38–2.2.56)

Fri 1/22 – Snow day

Thurs 1/28 – Exploratory Class 4
Topics: Confounding (cont.); Interaction; Exploratory data analysis summary
Lecture notes: pp. 2.3.5–2.3.51 [slides: Part 2\Explore3]

Part 3: Logistic Regression

Fri 1/29 – Logistic Class 1
Topics: Overview of logistic regression: model, Odds ratios, Confidence intervals
Lecture notes: pp. 3.2.1–3.2.31 [slides: Part 3\Log2]

Thurs 2/4 – Problem set #1 on Exploratory Data Analysis  [Exploratory Classes 1 – 4]
[Note: Also, Linear Regression Review lecture on this day – see below]

Thurs 2/4 – Linear Regression Review
Topics: Review of multiple linear regression
Lecture notes: pp. 3.1.1–3.1.33 [slides: Part 3\Linear1]
  Note: Read over slides before class – not time to cover all of them
**Part 3: Logistic Regression (cont.)**

**Fri 2/5 – Logistic Class 2**
Topics: Odds ratios and confidence intervals with interaction; Coding the exposure
Lecture notes: pp. 3.2.32–3.2.61  [slides: Part 3\Log2]

**Thurs 2/11– Logistic Class 3**
Topics: Coding exposure variable (cont.); Maximum likelihood estimation; Likelihood ratio tests; Modeling strategies
Lecture notes: pp. 3.2.62–3.2.87; 3.3.1–3.3.23  [slides: Part 3\Log2, Log3]

**Fri 2/12 – Logistic Class 4**
Topics: Examples – traditional Epidemiologic model; Modeling categorical variables with more than two categories (intro)
Lecture notes: pp. 3.3.24–3.3.75  [slides: Part 3\Log3]

**Thurs 2/18 – Problem set #2 on Logistic Regression  [Logistic Classes 1 – 4]**

**Fri 2/19 – Logistic Class 5**
Topics: Modeling categorical variables with more than 2 categories (cont.); Ordinal and nominal outcomes (more than 2 categories)
Lecture notes: pp. 3.3.76–3.3.114  [slides: Part 3\Log3]

**Thur 2/25 – Logistic Class 6**
Topics: Calculating risk ratios from binomial regression models; Intro to longitudinal models [GEE]
Lecture notes:
- PUBH 741 Review: Cluster sampling  pp. 5.3–5.10  [slides: “PUBH741-Part5.pdf”]
- PUBH 742 notes: pp. 3.4.1–3.4.49  [slides: Part 3\Log4]

**Fri 2/26 – Logistic Class 7**
Topics: Continuation of longitudinal models [GEE]
Lecture notes: pp. 3.4.50–3.4.86  [slides: Part 3\Log4]

**Thurs 3/3– Problem set #3 on Logistic Regression  [Logistic Classes 5 & 6]**
Part 3: Logistic Regression (cont.)

Fri 3/4 – Predictive Class 1
Topics: Predicted risk; Strategy: variable selection, descriptive statistics, specifying starting model, variable reduction, quantifying predictive ability, validation
Lecture notes: pp. 3.5.1–3.5.36 [slides: Part 3\Predict5]

Thurs 3/10 – Predictive Class 2
Topics: Example study; Quantifying predictive ability
Lecture notes: pp. 3.5.37–3.5.82 [slides: Part 3\Predict5]

Fri 3/11 – Predictive Class 3
Topics: Comparing ROC curves; Reliability; Model validation
Lecture notes: pp. 3.5.83–3.5.117 [slides: Part 3\Predict5]

Thurs 3/17 – Spring Break

Fri 3/18 – Spring Break

Thurs 3/24 – Predictive Class 4
Topics: Validation (cont.); Strategy for a predictive linear regression model
Lecture notes: pp. 3.5.118–3.5.155 [slides: Part 3\Predict5]

Fri 3/25 – Holiday (no class)

Thurs 3/31 – Problem set #4 on Predictive Models [Predictive Classes 1 – 4; Carson article]
Part 4: Survival Analysis

Fri 4/1 – Survival Class 1
Topics: Review of survival analysis; Cox proportional hazards model
Lecture notes: pp. 4.1.1–4.1.52; pp. 4.2.1–4.2.27 [slides: Part 4\Surv1 & Surv2]

[Note: pp. 4.1.1–4.1.52 contain the same survival lecture notes covered in PUBH 741 (Class 18, 10/30); please review these slides before class as we won’t have time to cover all of them in class today; if you want a more in depth review, here is the lecture capture from PUBH 741]
https://echo2.med.unc.edu:8443/ess/echo/presentation/a7bc08c3-f971-4be4-8349-3fe51197cc a3

Thurs 4/7 – Survival Class 2
Topics: Proportional hazards (PH) assumption
Lecture notes: pp. 4.2.28–4.2.75 [slides: Part 4\Surv2]

Fri 4/8 – Survival Class 3
Topics: Modeling strategy; Exploratory data analysis; Example (one exposure)
Lecture notes: pp. 4.3.1–4.3.45 [slides: Part 4\Surv3]

Thurs 4/14 – Survival Class 4
Topics: Example (predictive model); Time dependent covariates; Repeated events
Lecture notes: pp. 4.3.46–4.3.60; pp. 4.4.1–4.4.28 [slides: Part 4\Surv3 & Surv4]

Fri 4/15 – Survival Class 5
Topics: Competing risks
Lecture notes: pp. 4.4.29–4.4.75 [slides: Part 4\Survival]

Thurs 4/21 – Problem set #5 on Survival Analysis [Survival classes 1 – 4]
[Note: Also, first sampling lecture on this day – see below]

Part 1: Sampling and Sample Size

Thurs 4/21 – Sampling Class 1
Topics: Sample selection; Sample size background
Lecture notes: pp. 1.1.1–1.1.36 [slides: Part 1\Sample1]

Fri 4/22 – Sampling Class 2
Topics: Calculations (2-sample t-test, paired t-test, two proportions, risk ratio, odds ratio, ANOVA)
Lecture notes: pp. 1.2.1 – 1.2.52 [slides: Part 1\Sample2]
Part 1: Sampling and Sample Size

[Wed 4/27 – Campus classes end]

Thurs 4/28 – Sampling Class 3
Topics: Calculations (cluster design, equivalency trials, non-inferiority trials)
Lecture notes: pp. 1.2.53–1.2.101 [slides: Part 1\Sample2]

Fri 4/29 – Sampling Class 4 [Note: Last day of PUBH 742]
Topics: Correcting for survey design (sample weights, etc.)
Lecture notes:
  PUBH 741 Review: Cluster sampling pp. 5.3–5.10 [slides: “PUBH741-Part5.pdf”]
  PUBH 742 notes: pp. 1.3.1–1.3.36 [slides: Part 1\Sample3]