**SYLLABUS**

**The New School**

**Quantitative Methods** | **Spring 2016**

Thursdays 6:00pm – 9:50 | 6 East 16th Street, Room 908

Professor: Aaron Hill Graduate Assistant: Andrew Gordon-Kirsch

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Course Description

This core graduate course prepares students to compute, apply, and interpret descriptive and inferential statistics. Students will learn basic functions in statistical computing in R software.

Course Materials

* Text: Healey, Joseph F. *Statistics: A Tool for Social Research*, 9th Edition.
* Edward R. Tufte: *Data Analysis For Politics And Policy*. E-book available for $2 at <http://www.edwardtufte.com/tufte/ebooks>
* Calculator: A basic scientific hand calculator.

Course Repository

<https://github.com/aaronxhill/quant16sp>

Communication and Resources

* Communication outside of the classroom will be conducted by email and Canvas. **Emails will be sent through Canvas, so if you do not regularly check your New School account, be sure to set your account to have them forwarded to your preferred email.** Notes, resources, and assignments will also be posted on Canvas.
* **Office hours**: Wednesdays 3:30 – 5:00pm; make appointments at Starfish
* The graduate teaching assistant is available as a resource throughout the semester. The teaching assistant is available by appointment and in special sessions for help with specific areas of course material and lab assignments.

Course Requirements

* Attend all classes. Absences must be excused in advance. Two absences may result in a grade reduction and three or more absences may result in failure of the course.
* The assigned readings are an important component to this course and are required. All lecture notes posted on Canvas are required reading.
* Ten in-class lab assignments will be given. Assignments must be submitted as directed.
* Optional: Bring your laptop to class on the days we are scheduled to have a Lab.

Grading

Midterm exam: 30%, final exam: 30%, and lab assignments: 40% (for ten assignments).  
Each lab assignment is worth four points toward your final grade; 4 points is rewarded to those who fulfill all requirements, 3 for most requirements, 2 for some requirements, 1 for few requirements, and 0 for no submission. Up to three resubmissions will be accepted.

Agenda and Reading Assignments

|  |  |  |
| --- | --- | --- |
| **Date** | **Topic** | **Reading\*/Notes** |
| 1/28 | Introduction & Fundamental Concepts |  |
|  | Basic Descriptive Statistics & Central Tendency |  |
| 2/4 | Dispersion / Distribution | Healey Ch. 1, 2, & 3 |
|  | Lab 1: Introduction to Statistical Computing; descriptive statistics | Lab |
| 2/11 | Probability | Healey Ch. 4 |
|  | Lab 2: Distribution, Tables, Crosstabs, and Visualization | Lab |
| 2/18 | The Normal Distribution; Inferential Statistics: Sampling and the Sampling Distribution | Healey Ch. 5 & 6 |
|  | Lab 3: Transforming variables | Lab |
| 2/25 | Estimation Procedures & Introduction to Hypothesis Testing | Healey Ch. 7 |
|  | Data collection lab |  |
| 3/3 | Hypothesis Testing: One-Sample and Two Sample | Healey Ch. 8 & 9 |
|  | Lab 4: t-tests |  |
| 3/10 | Exam Review |  |
| 3/17 | **Midterm Exam** (will cover material through Healey Chapter 9) |  |
| *3/24* | *No class; Spring Break* |  |
| 3/31 | Hypothesis Testing: ANOVA | Tufte Ch. 1 & 2  Healey Ch. 10 |
|  | Lab5: ANOVA | Lab |
| 4/7 | Chi Square  Measures of Association/Correlation | Healey Ch. 11, 12, 13, 14, & 15 |
|  | Labs 6 & 7: Chi Square and Association/Correlation | Lab |
| 4/14 | Simple Regression | Tufte Ch. 3  Skim Healey Ch. 17, Sections 17.3, 17.4, 17.6, & 17.7 only |
|  | Lab 8: Simple Regression | Lab |
| 4/21 | Introduction to Multivariate Analysis | Tufte Ch. 4 |
|  | Lab 9: Multiple Regression | Lab |
| 4/28 | Multiple Regression |  |
|  | Lab 10: Regression Diagnostics | Lab |
| 5/5 | Exam Review |  |
| 5/12 | **Final Exam** |  |

***\*Reading assignments should be completed before the class on the date assigned. For example, when you come to class on 2/4, you should have already read chapters 1, 2, and 3 of the Healey textbook.***

**Recommended Practice Problems**

|  |  |
| --- | --- |
| **Do By** | **Assignment (from textbook, unless otherwise indicated)** |
| 2/4 | 1.4, 2.2, 2.4, 3.2, 3.10, 3.14 |
| 2/11 | 4.4 (calculate manually), 4.6 (calculate in Excel), 4.16 |
| 2/18 | 5.2, 5.4, 5.10, 5.14 |
| 2/25 | 7.4, 7.8, 7.12, 7.18 |
| 3/3 | 8.2, 9.4, 9.8, 9.12, Sample midterm exam\* |
| 3/17 | 10.6 |
| 3/31 | 11.4, 11.8 |
| 4/7 | 14.2 & Interpretation of output\*: measures of association |
| 4/21 | Interpretation of output\*: multiple regression |
| 5/5 | Sample final exam\* |

\*Will be posted to Canvas at least one week prior to deadline.

Practice problems are highly recommended, but will not be graded. You should always bring your completed practice problems for the entire semester to every TA session and meeting with the professor or TA. You may be asked at random to go through one of the problems in class. Generally, these practice problems are meant to be the ***bare minimum*** of the work you should be doing outside of class. You should also work through odd-numbered problems as needed, and any other problems that will help prepare you for exams. These assignments, along with other problems from the book and class materials will be reviewed in the TA sessions.

**Proportion**

**Percentage**

**Mean**

**Ratio**

**Percent Change**

**Standard Deviation**

**Z-Scores**

**Estimation Procedures, mean (large samples)**

**Estimation Procedures, proportion (large samples)**

**Z Scores for Common Levels of Alpha**

|  |  |  |  |
| --- | --- | --- | --- |
| **Level of Confidence** | **α** | **Z-Score, Two Tail** | **Z-Score,**  **One Tail** |
| 90% | 0.10 | ± 1.65 | + *or* – 1.29 |
| 95% | 0.05 | ± 1.96 | + *or* – 1.65 |
| 99% | 0.01 | ± 2.58 | + *or* – 2.33 |
| 99.9% | 0.001 | ± 3.29 | + *or* – 3.10 |

**One-Sample Hypothesis Tests**

*Means, large sample (σ is known)*

*Means, small sample (or, large sample whenσ is unknown)*

*Proportions, large samples*

**Two-Sample Hypothesis Tests**

*Means, large samples*

*Means, small samples*

*Proportions, large samples*