**CALIFORNIA POLYTECHNIC STATE UNIVERSITY**
San Luis Obispo, California

**STAT 421: Survey Sampling and Methodology** **Fall 2015**

## 1. Catalog Description

**STAT 421: Survey Sampling and Methodology**

Survey planning, execution, and analysis. Principles of survey research, including non-sampling and sampling error topics. Survey sample designs, including simple random, systematic, stratified, cluster, and multi-stage. Estimation procedures and sample size calculations. 4 lectures.

## 2. Required Background and/or Experience

Successful completion of one of the following:
IME 326 or STAT 252 or STAT 302 or STAT 312 or STAT 313 or STAT 512 or STAT 513.

## 3. Expected Outcomes

The student should be able to:

- **a.** Understand and use the terminology associated with the field of survey research.
- **b.** Understand how to design and implement the steps required to conduct a sample survey.
- **c.** Understand the nature and causes of non-sampling error, and understand strategies for minimizing it;
- **d.** Locate, understand, and use survey research publications.
- **e.** Understand and use the standard terminology associated with survey sample design.
- **f.** Distinguish between and describe the advantages and disadvantages of various survey sampling methods; including simple random sampling, systematic sampling, stratified sampling, cluster sampling, and multi-stage designs.
- **g.** Understand the principles used to develop survey baseweights and non-response adjusted weights.
- **h.** Compute parameter estimates for the population mean, population total and population proportion, under various sampling schemes.
- **i.** Compute variance estimates for a mean, total, and proportion under various sampling schemes.
- **j.** Identify appropriate statistical software programs for use when a complex sample design has been employed.

## 4. Text and References

Possible Text: Scheaffer, Mendenhall, Ott, Gerow, *Elementary Survey Sampling*, Seventh Edition, Brooks/Cole Cengage Learning, 2012.

Possible References: Biemer, Lyberg, *Introduction to Survey Quality*, Wiley, 2003.

Lohr, *Sampling: Design and Analysis*, Second Edition, Brooks/Cole Cengage Learning, 2010.

## 5. Minimum Student Materials

- A calculator
- Access to the textbook
- Computer access with statistical software (EXCEL, Minitab, JMP, R and SAS) and word processing and presentation software (WORD, PowerPoint).

## 6. Minimum University Facilities

A classroom with:

- A chalkboard and audiovisual equipment.
- Computer access for each student and the instructor with statistical software (EXCEL, Minitab, JMP, R and SAS) and word processing and presentation software (WORD, PowerPoint).

The Statistics Studio Classroom is preferred for this course.

## 7. Expanded Description of Content

| Content | Number of lectures |
|---|---|
| **I.** Principles of Survey Research Methodology | 12 |
| **a.** terminology | |
| **b.** planning a survey | |
| **c.** modes of data collection | |
| **d.** question and questionnaire design | |
| **e.** sources of error in sample surveys | |
| **f.** survey cost considerations | |
| **g.** survey research organizations and publications | |
| **II.** Survey sampling methods/estimation/sample size determination | 12 |
| **a.** simple random sampling | |
| **b.** stratified sampling and post-stratification | |
| **c.** systematic sampling | |
| **d.** cluster sampling | |
| **III.** Principles of survey weighting | 4 |
| **a.** development of baseweights and non-response adjusted weights | |
| **b.** use of weights in estimation of a population mean and a population proportion | |
| **c.** statistical software programs that can properly accommodate survey weights | |
| **IV.** Additional topics to be selected from the following list (as time and interest allows) | 8 |
| **a.** use of census and other government resources in survey design | |
| **b.** variance estimation procedures for complex surveys | |
| **c.** imputation strategies | |
| **d.** estimating population size using capture/recapture methodology | |
| **e.** acceptance sampling | |
| **f.** randomized response models | |
| **g.** ratio and regression estimation | |
| **h.** two-stage cluster sampling | |
| **Total** | **36** |

## 8. Method of Evaluating Outcome

Assignments, projects, presentations, and examinations appropriate for the course.