DE LA SALLE UNIVERSITY
College of Science
Department of Mathematics

SAMPTHE – Introduction to Sampling Theory
Prerequisite: Stathe1

Instructor: 
Consultation Hours: 
Contact details: 
Class Schedule and Room: 

Course Description
This is a course introducing the student to the basic principles of sampling. This course includes the steps to be undertaken in conducting sample surveys, theoretical discussion, on the different sampling designs (simple random sampling, and multi-staged cluster sampling) estimation procedures using the various designs, sample size estimation as well as variance reduction techniques.

Learning Outcomes
On completion of this course, the student is expected to present the following learning outcomes in line with the Expected Lasallian Graduate Attributes (ELGA)

<table>
<thead>
<tr>
<th>ELGA</th>
<th>Learning Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical and Creative Thinker</td>
<td>At the end of the course, the students will apply appropriate sampling theories in designing surveys that is appropriate for some real-life problems.</td>
</tr>
<tr>
<td>Effective Communicator</td>
<td></td>
</tr>
<tr>
<td>Lifelong Learner</td>
<td></td>
</tr>
<tr>
<td>Service-Driven Citizen</td>
<td></td>
</tr>
</tbody>
</table>

Final Course Output
As evidence of attaining the above learning outcomes, the student is required to submit the following during the indicated dates of the term.

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>Required Output</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the end of the course, the students will apply appropriate sampling theories specifically in designing surveys based on problems in the real world.</td>
<td>An inquiry-based group project highlighting the use of sampling theories in designing surveys to answer problem encountered in the real world.</td>
<td>Week 13</td>
</tr>
</tbody>
</table>

Rubric for assessment

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>EXEMPLARY</th>
<th>SATISFACTORY</th>
<th>DEVELOPING</th>
<th>BEGINNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulation of the Research Problem and Objectives (10%)</td>
<td>Research problem and objectives are clearly defined and significantly demonstrates evidence that the research problem was researched and designed well.</td>
<td>Research problem and objectives are clearly defined and significant</td>
<td>Research problem is clearly defined but some objectives are insignificant.</td>
<td>Research problem and objectives are vague and insignificant</td>
</tr>
<tr>
<td>Correct Application of Sampling Theories and Concepts (35%)</td>
<td>Application of sampling theories and concepts are appropriate with correct interpretations and relevant conclusions.</td>
<td>Application of sampling theories and concepts are appropriate with correct interpretations.</td>
<td>Some sampling theories are inappropriate in designing surveys.</td>
<td>Application of sampling theories in designing surveys inappropriate.</td>
</tr>
<tr>
<td>Depth of Analysis (30%)</td>
<td>The analysis convinces the reader about the wisdom of conclusions, implications and consequences</td>
<td>The analysis engages the reader to appreciate the wisdom of conclusions, implications and consequences on</td>
<td>The analysis has limited ideas that do not explain the wisdom of conclusions, implications and consequences on</td>
<td>The analysis has incorrect ideas and conclusions.</td>
</tr>
</tbody>
</table>
on the basis of statistical methods and findings.

the basis of statistical methods and findings.

the basis of statistical methods and findings.

**Clarity and Organization of Written Report (10%)**
- Written report is organized logically and presented clearly with effective transitions.
- Written report is organized logically and presented clearly.
- Written report is organized and some discussions are not clear.
- Written report is not organized.

**Oral Presentation (15%)**
- Overall presentation is creative and well organized with innovative ideas.
- Overall presentation is creative and well organized.
- Overall presentation is organized.
- Overall presentation is not organized.

### Additional Requirements
- Inquiry Plans/Activities
- Skills Check
- Mid Term Exam
- Final Exam

### Grading System

<table>
<thead>
<tr>
<th>Scale:</th>
<th>95-100%</th>
<th>89-94%</th>
<th>83-88%</th>
<th>78-82%</th>
<th>72-77%</th>
<th>66-71%</th>
<th>60-65%</th>
<th>&lt;60%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.0</td>
<td>3.5</td>
<td>3.0</td>
<td>2.5</td>
<td>2.0</td>
<td>1.5</td>
<td>1.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average of quizzes</th>
<th>79%</th>
<th>55%</th>
<th>45%</th>
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</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>7%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Final Project</td>
<td>14%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Final examination</td>
<td>--</td>
<td>30%</td>
<td>40%</td>
</tr>
</tbody>
</table>

### Learning Plan

<table>
<thead>
<tr>
<th>LEARNING OUTCOME</th>
<th>TOPIC</th>
<th>WEEK NO.</th>
<th>LEARNING ACTIVITIES</th>
</tr>
</thead>
</table>
| At the end of the course, the student will apply appropriate sampling theories and concepts in solving various conceptual and real-world problems. | **I. INTRODUCTION**
1.1 Basic Principles
1.2 Finite Population versus Infinite Population Methods
1.3 Census versus Surveys
1.4 The Principal Steps in Sample Survey Operations
1.5 Probability Sampling vs Non-Probability Sampling
1.6 Source of Errors in Surveys
1.7 Statistical Inference in Surveys | 6 hours/Weeks 1-2 | Prior knowledge and beliefs survey
Concept mapping
Library work
Group discussion and presentations
Skills exercises
Student self-assessment and reflection |
| | **II. SIMPLE RANDOM SAMPLING (SRS)**
2.1 Definition and Purpose
2.2 Notations
2.3 Sample Selection
2.4 Mean and Variance Estimators and their Properties
2.5 Finite Population Correction | 9 hours/Week 3-5 | |
### Factor
- 2.6 Estimation of Ratios
- 2.7 Sampling Proportions and Percentages
- 2.8 Estimation of Sample Size

**Quiz No.1**
1.5 hours/Week 6

### III. STRATIFIED SAMPLING
- 3.1 Definition and Purpose
- 3.2 Mean and Variance Estimators and their Properties
- 3.3 Sample Allocation
- 3.4 Construction of Strata
- 3.5 Relative Precision over SRS
- 3.6 Estimation of Sample Size

**III. STRATIFIED SAMPLING**
4.5 hours/Week 6-7

### IV. SYSTEMATIC SAMPLING
- 4.1 Linear Systematic Sampling
- 4.2 Circular Systematic Sampling
- 4.3 Variance Estimation
- 4.4 Some Issues Concerning Systematic Sampling

**IV. SYSTEMATIC SAMPLING**
3 hours/Week 8

### V. CLUSTER AND MULTI-STAGE SAMPLING
- 5.1 Cluster Sampling
- 5.2 Two Stage Sampling
- 5.3 Stratification in Cluster Sampling
- 5.4 Efficiency of Cluster Sampling Designs
- 5.5 Sample Size Determination

**Quiz No.2**
1.5 hours/Week 12

### VI. RATIO AND REGRESSION ESTIMATION
- 6.1 Ratio Estimators
- 6.2 Properties of the Ratio Estimator
- 6.3 The Regression Estimator
- 6.4 Properties of the Regression Estimator
- 6.5 Efficiency

**VI. RATIO AND REGRESSION ESTIMATION**
3 hours/Week 12

- Inquiry-based Group Project
  - 3 hours/Week 13

- Final Examination
  - 2 hours/Week 14

**References**

**Online Resources**
Class Policies

1. The required minimum number of quizzes for a 3-unit course is 3, and 4 for 4-unit course. No part of the final exam may be considered as one quiz.

2. Cancellation of the lowest quiz is not allowed even if the number of quizzes exceeds the required minimum number of quizzes.

3. As a general policy, no special or make-up tests for missed exams other than the final examination will be given. However, a faculty member may give special exams for
   A. approved absences (where the student concerned officially represented the University at some function or activity).
   B. absences due to serious illness which require hospitalization, death in the family and other reasons which the faculty member deems meritorious.

4. If a student missed two (2) examinations, then he/she will be required to take a make up for the second missed examination.

5. If the student has no valid reason for missing an exam (for example, the student was not prepared to take the exam) then the student receives 0% for the missed quiz.

6. Students who get at least 89% in every quiz are exempted from taking the final examination. Their final grade will be based on the average of their quizzes and other prefinal course requirements. The final grade of exempted students who opt to take the final examination will be based on the prescribed computation of final grades inclusive of a final examination. Students who missed and/or took any special/make-up quiz will not be eligible for exemption.

7. Learning outputs are required and not optional to pass the course.

8. Mobile phones and other forms of communication devices should be on silent mode or turned off during class.

9. Students are expected to be attentive and exhibit the behavior of a mature and responsible individual during class. They are also expected to come to class on time and prepared.

10. Sleeping, bringing in food and drinks, and wearing a cap and sunglasses in class are not allowed.

11. Students who wish to go to the washroom must politely ask permission and, if given such, they should be back in class within 5 minutes. Only one student at a time may be allowed to leave the classroom for this purpose.

12. Students who are absent from the class for more than 5 meetings will get a final grade of 0.0 in the course.

13. Only students who are officially enrolled in the course are allowed to attend the class meetings.

Approved by:

DR. ARTURO Y. PACIFICADOR, JR.
Chair, Department of Mathematics