DE LA SALLE UNIVERSITY
College of Science
Department of Mathematics

CATDATA – *Categorical Data Analysis*
Prerequisite: LINEMOD *Prerequisite to:*

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

Course Description

A course on statistical methods for categorical (or cross-classified) response data.

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)

ELGA	Learning Outcome
Critical and Creative Thinker Effective Communicator Lifelong Learner Service-Driven Citizen	At the end of the course, the student will apply appropriate statistical concepts, processes, tools, and technologies in the solution to various conceptual and real-world problems.

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.

Learning Outcome	Required Output	Due Date
At the end of the course, the student will apply appropriate statistical concepts, processes, tools, and technologies in the solution to various conceptual and real-world problems.	An inquiry-based group presentation highlighting the uses of categorical data analysis in different problem situations encountered in the medical and related fields	Week 13

Rubric for assessment

The following rubric will be used for grading students' rewritten solutions. The new quiz score will be obtained by adding ORIGINAL QUIZ SCORE and 20% of the REWRITTEN SCORE. Note that students will only rewrite items that they did not get perfectly.

CRITERIA	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Formulation of the Research Problem and Objectives (10%)	Research problem and objectives are clearly defined and significant; Demonstrates evidence that the research problem was researched and designed well.	Research problem and objectives are clearly defined and significant.	Research problem is clearly defined but some objectives are insignificant.	Research problem and objectives are vague and insignificant.
Correct Application of the Statistical Concepts (35%)	Statistical analyses are appropriate with correct interpretations and relevant conclusions.	Statistical analyses are appropriate with correct interpretations.	Some statistical analyses are inappropriate.	Statistical analyses are inappropriate
Depth of Analysis (30%)	The analysis convinces the reader about the wisdom of conclusions, implications and consequences on the basis of statistical methods and findings	The analysis engages the reader to appreciate the wisdom of conclusions, implications and consequences on the basis of statistical methods and findings	The analysis have limited ideas that do not explain the wisdom of conclusions, implications and consequences on the basis of statistical methods and findings	The analysis has incorrect ideas and conclusions.

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

- Quizzes
- Class Participation (seatwork and group exercises, homework, recitation)
- Computer hands-on exercises using SAS
- Final Examination

Grading System

	FOR EXEMPTED STUDENTS (w/out Final Exam)	**FOR STUDENTS with FINAL EXAM**	
		with no missed quizzes	*with one missed quiz*
Average of quizzes	90%	60%	50%
Other requirements	10%	10%	10%
Final exam		30 %	40%

Scale:

95-100%	4.0
89-94%	3.5
83-88%	3.0
78-82%	2.5
72-77%	2.0
66-71%	1.5
60-65%	1.0
<60%	0.0

Learning Plan

LEARNING OUTCOME	TOPIC	WEEK NO.	LEARNING ACTIVITIES
At the end of the course, the student will apply appropriate statistical concepts, processes, tools, and technologies in the solution to various conceptual and real-world problems	1. Introduction 1.1 Levels of measurement 1.2 Categorical response data 1.3 Types of medical studies 1.4 Vital statistics and demographic methods	Week 1	Prior knowledge and beliefs survey Concept mapping Library work Group discussion and presentations Computer laboratory activities (SAS) Skills exercises Student self-assessment and reflection
	2. Contingency Tables 2.1 Notation and Probability structure 2.2 Joint, Marginal, and Conditional probabilities 2.3 Independence 2.4 Comparing proportions 2.5 Relative risk and Odds ratio 2.6 Evaluation of a screening test	Week 2 - 3	
	3. Inference for Two-Way Contingency Tables 3.1 CIs, SHyTs for proportions, RR, and OR 3.2 Chi-squared tests of independence 3.3 Fisher's exact test 3.4 Contingency coefficients	Week 4 - 5	
	Quiz No. 1	**Week 6**	
	4. Generalized Linear Models (GLMs) 4.1 Components of a GLM 4.2 Logit and Probit models 4.3 Poisson, Negative Binomial, and Count regression models	Week 6	

	5. Logistic Regression 5.1 Sampling models and their distributions 5.2 Fitting logit models 5.3 Odds ratio interpretation 5.3 Inference for logit models 5.4 Logit models with categorical predictors 5.5 Multiple logistic regression	Week 7 – 9	
	Quiz No. 2	**Week 9**	
	6. Loglinear Models for Contingency Tables 6.1 Three-way contingency tables 6.2 Types of independence: mutual, joint, conditional, marginal 6.3 Simpson's paradox 6.4 Abbreviated notation 6.5 Collapsibility 6.6 Model selection and diagnostics 6.7 Higher-dimensional contingency tables 6.8 The logistic-loglinear connection	Week 10 - 12	
	Quiz No. 3	**Week 12**	
	Group Reports* Final Project	Week 13	
	Final Examination	**Week 14**	

***Suggested topics for group reports:**

Multicategory logit models for nominal responses
Multicategory cumulative logit models for ordinal responses
Paired-category ordinal logits
Logistic regression for matched pairs

References

Agresti, Alan. (2007). *An Introduction to Categorical Data Analysis (2nd edition).* Hoboken, N.J.: Wiley.
Agresti, Allan. (2002). *Categorical Data Analysis (2nd edition).* Hoboken, N.J.: Wiley.
Fienberg, Stephen. (2004). *The Analysis of Cross-Classified Data, (2nd edition).*Springer.
Hosmer and Lemeshow (2000). *Applied Logistic Regression, (2nd Edition).* Wiley-Interscience Publication.

Online Resources

GraphPad Software QuickCalcs from http://www.graphpad.com/quickcalcs/CatMenu.cfm
Thompson, Laura A. (2008). R (and S-PLUS) Manual to Accompany Agresti's Categorical Data Analysis (2nd edition) Accessed September 26, 2012 from: http://www.stat.purdue.edu/~zhanghao/MAS/handout/Splusdiscrete2.pdf
Website for Agresti's Categorical Data Analysis, 2nd edition Accessed September 26, 2012 from: http://www.stat.ufl.edu/~aa/cda2/cda.html

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:

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