

SDSC8013: STATISTICAL METHODS FOR CATEGORICAL DATA ANALYSIS

Effective Term

Semester B 2025/26

Part I Course Overview

Course Title

Statistical Methods for Categorical Data Analysis

Subject Code

SDSC - Data Science

Course Number

8013

Academic Unit

Data Science (DS)

College/School

College of Computing (CC)

Course Duration

One Semester

Credit Units

3

Level

R8 - Research Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

In this course, students will learn how to use descriptive and test statistics, statistical models and statistical inferences to analyse categorical data. Topics include statistical inference using odds ratios and relative risks, multi-way contingency tables tests for stratified analysis, odds ratio and relative risk, generalized linear models for discrete data multi-category logit model for nominal and ordinal responses inference for matched-pairs and loglinear models. Students will learn where these methods may be applied, how to apply them, and how to properly interpret the results. The course is appealing to those interested in categorical data analysis and examples are based on case studies. Students will learn statistical way of thinking in analyzing categorical data and the methodology can be applied to different fields to solve similar problems.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe different study designs and data types in categorical data analysis	15	x		
2	Explain different descriptive and test statistics and generalized linear models for different types of outcomes	20	x	x	
3	Utilize software packages and programs to conduct statistical tests and fit statistical models	30	x	x	
4	Interpret model results properly and draw conclusions in case studies	20		x	x
5	Implement taught statistical methods to analyze real-world datasets	15		x	x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students will gain knowledge on different categorical data types and statistical tests and models through lectures with examples of case studies.	1, 2, 3, 4
			26 hours/sem

2	Tutorial Sessions	Students will engage in tutorial activities to utilize computer software tools for implementing statistical tests and models in real-world data analysis.	1, 2, 3, 4, 5	13 hours/sem
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Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Assignments Questions are designed to evaluate how well students are able to apply statistical methods and computational tools learnt in class to analyze datasets and solve problems.	1, 2, 3, 4, 5	30	-	Yes
2	Midterm Exam Examination will assess whether students get a deep understanding of statistical methods and tools and their applications in solving different problems.	1, 2, 3, 4, 5	30	-	No
3	Project A final project using real data will assess students' abilities to choose appropriate statistical tests and models to solve real-world problems, interpret results properly, draw conclusions, and summarize findings in the write-up.	1, 2, 3, 4, 5	40	-	Yes

Continuous Assessment (%)

100

Examination (%)

0

Minimum Continuous Assessment Passing Requirement (%)

0

Minimum Examination Passing Requirement (%)

0

Assessment Rubrics (AR)

Assessment Task

Assignments (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to choose appropriate models and tests for given tasks and apply statistical tools to solve problems and draw conclusions based on data.

Excellent

A+, A, A-

Good

B+, B, B-

Fair

C+, C, C-

Marginal

D

Failure

F

Assessment Task

Midterm Exam (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Students' level of achievements of the intended learning outcomes, with emphases on understanding, correct application of statistical methods, correct interpretation, and conclusions.

Excellent

A+, A, A-

Good

B+, B, B-

Fair

C+, C, C-

Marginal

D

Failure

F

Assessment Task

Project (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to demonstrate a deep understanding of the concepts, choose appropriate tests and models for solving problems, apply methods correctly, interpret results and draw conclusions properly, and summarize key findings.

Excellent

A+, A, A-

Good

B+, B, B-

Fair

C+, C, C-

Marginal

D

Failure

F

Assessment Task

Assignments (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to choose appropriate models and tests for given tasks and apply statistical tools to solve problems and draw conclusions based on data.

Excellent

A+, A, A-

Good

B+, B

Marginal

B-, C+, C

Failure

F

Assessment Task

Midterm Exam (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Students' level of achievements of the intended learning outcomes, with emphases on understanding, correct application of statistical methods, correct interpretation, and conclusions.

Excellent

A+, A, A-

Good

B+, B

Marginal

B-, C+, C

Failure

F

Assessment Task

Project (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to demonstrate a deep understanding of the concepts, choose appropriate tests and models for solving problems, apply methods correctly, interpret results and draw conclusions properly, and summarize key findings.

Excellent

A+, A, A-

Good

B+, B

Marginal

B-, C+, C

Failure

F

Part III Other Information

Keyword Syllabus

- Odds ratios and relative risks
- Wald tests and likelihood ratio tests
- Stratified analysis, multi-way contingency tables
- Generalized linear models for discrete data
- Multi-category logit model for nominal and ordinal responses
- Matched-pairs
- Loglinear models

Reading List

Compulsory Readings

Title	
1	Agresti, A. (2007). An Introduction to Categorical Data Analysis, 2nd Edition. New York: Wiley.

Additional Readings

Title	
1	Agresti, A. (2013). Categorical Data Analysis, 3rd Edition. New York: Wiley.
2	Bilder, C. R., & Loughin, T. M. (2024). Analysis of categorical data with R, 2nd Edition. Chapman and Hall/CRC.