

Applied Categorical Data Analysis

STAT 371 (ASo1)

Fall 2023

Instructor: Dr. Karen Buro
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Lecture Time: MWF 14: 00 – 14:50
Lecture Room: 5-207

Lab Time: T 14:00 – 15:50 pm
Lab Room: 7-265

Office Hours: M 13:00-13:50 (Learning Center), TF 13:00-13:50 (my office)

Course Credits: 3
Course Hours: Lecture 45 Lab 24 Seminar 0

Course Description: This course presents fundamental methods in categorical data analysis emphasizing applications. Topics include: analysis of two-way tables, models for binary response variables, loglinear models, and models for ordinal data and multinomial response data.

Course Objectives:

Upon completion of this course, the student will be able to...

- Choose the appropriate tool for analyzing categorical data
- Conduct a categorical data analysis using a program package
- Interpret the results of a categorical data analysis
- Effectively communicate the results from a categorical data analysis

Course Prerequisite:

A minimum grade of C- in either STAT 252 or STAT 266

Students are responsible for having all prerequisites required for a given course. Prerequisite checks are periodically carried out and any students who do not have the appropriate prerequisite may be removed from the course. If you are removed from the course, you may be responsible for any tuition costs up to the date of removal.

Transfer Credit as prerequisite: Any courses from another post-secondary institute cannot be used as a prerequisite until assessed and officially approved as transfer credit.

Learning Resources (recommended):

Introduction to Categorical Data Analysis, Agresti, A., 3rd edition, Wiley

Course Format: This course will be conducted face-to-face on campus at the scheduled time and location listed above. It is not designed to be a hybrid or online course. Students will be required to come to class to learn the relevant course material. Additionally, most course related announcements will be made at the start of each lecture.

Stat 371 Labs with SPSS

In the labs, you will be using the SPSS software package for data analysis. SPSS is one of the most frequently used statistical software packages. With a little practice, you can perform the complex calculations needed for statistical analyses of large sets of data in a relatively routine manner. Lecture and Lab assignments will be combined. The lab will also require you to complete a data analytic project applying categorical data analysis tools.

Assignments and/or Reports:

Due dates for assignments and lab project at midnight of indicated day.

Assignments will be submitted through Crowdmark.

	Assignments
1	September 22
2	October 6
3	October 20
4	November 3
5	November 24
6	December 8
Project Report	December 8

Assignment questions will be posted in a timely manner on meskanas.

To submit solutions for an assignment either create a pdf file or write the solutions on paper and take pictures of each page. Follow the link in meskanas to Crowdmark to drop your solutions into the appropriate box on the website.

Evaluation:

Midterm Examination	20%
Final Examination*	35%
Assignments	25%
Lab Project Report	20%
	100%

Examination Dates:**Midterm Examination:** October 20 in class**Final Examination*:** TBA

*Students are responsible for verifying the date of the final exam in the MyStudentSystem.

Format of Examinations:

All exams will be closed book and include short and long answers, no multiple choice.

Grading:

The official grading system at MacEwan University is the 12-point letter grade system. While instructors may use percentages to aid in their grade development, percentages are not part of MacEwan University's official grading system. Please see [Grading Policy](#).

Grade	Percentage	Grade Point	Descriptor
A+	95-100	4.0	Outstanding
A	90-94	4.0	Excellent
A-	85-89	3.7	
B+	80-84	3.3	Good
B	75-79	3.0	
B-	70-74	2.7	
C+	65-69	2.3	Satisfactory
C	60-64	2.0	
C-	55-59	1.7	
D+	50-54	1.3	Poor
D	45-49	1.0	
F	0-44	0.0	Fail

Please Note:

1. Official grades will be provided by the Office of the University Registrar through myStudentSystem.
2. A minimum grade of C- is required to receive transfer credit or to satisfy a prerequisite for a higher level course.
3. **In order to obtain a C- or better in the course, a student must obtain a minimum of 40% on the final examination.**

Recorded Course Material: In this class, students may not make audio or video recordings of any course activity unless the student has an approved accommodation from Access and Disability Resources permitting the recording class meetings. In such cases, the accommodation letter must be presented to the instructor in advance of any recording being done and all students in the course will be notified whenever recording will be taking place. Students who are permitted to record classes are not permitted to redistribute audio or video recordings of statements or comments from the course to

individuals who are not students in the course without the express permission of the faculty member and of any students who are recorded.

STUDENT RESPONSIBILITIES AND COURSE EXPECTATIONS:

Students must communicate with their instructors using their myMacEwan email accounts.

Students must be aware of their academic and non-academic responsibilities as outlined in the [Student Code of Conduct Policy](#) and available on the [Office of Student Conduct](#) website.

1. ACADEMIC INTEGRITY: Students are responsible for understanding the [Student Academic Integrity Policy](#) and what constitutes academic misconduct and be aware of the [Student Academic Misconduct Procedure](#). All incidents of academic misconduct, as outlined in the policy, are reported and recorded by the [Academic Integrity Office](#) and resources are available on MacEwan's [Academic Integrity](#) website.

MacEwan University's Academic Integrity Policy promotes honesty, fairness, respect, trust, and responsibility in all academic work. The policy defines academic misconduct as the following: "Participating in acts by which a person gains or attempts to gain an unfair academic advantage thereby compromising the integrity of the academic process," including:

- cheating
- plagiarism
- improper collaboration
- contract cheating (severe misconduct)
- fabrication and falsification
- helping, or attempting to help, another student commit academic misconduct
- obtaining an unfair advantage
- multiple submissions

In this course appropriate collaboration is defined by: READ THIS

- exchanging ideas for how to approach **assignment questions** is acceptable
- all submitted work must have been completed individually
- all quizzes and exams can only include work created by the submitting student
- any material created and submitted as part of a graded course component, students will only access authorized resources (e.g. textbooks, course readings etc.) and use technological aids only as permitted by the instructor.
- students will not share test, exam, or assignment questions or answers through social media, posts, texting, or otherwise.
- Students are prohibited from using **generative artificial intelligence tools**, such as ChatGPT and DALL.E 2, on their assessments in this course.

2. REGISTRATION STATUS: Students are responsible for ensuring the accuracy of their registration in courses. This can be checked at any time using *MyStudentSystem*.

3. PREREQUISITES: Students who do not have the appropriate prerequisite may be removed from the course and may be responsible for any tuition costs up to the date of removal.

4. WITHDRAWING FROM THE COURSE: Students who stop attending class must officially withdraw from the course. This must be done by the official withdrawal deadline for the course, which is available at the Office of the University Registrar. Failure to withdraw properly will result in a grade being assigned that is based on completed course work only, with a grade of 0% being assigned to all missed exams/assignments.

5. SPECIAL ACCOMMODATIONS: Please see the [Human Rights and Accessibility Policy](#) and [Students with Disabilities Procedure](#).

Students who require special accommodation in this course due to a disability and/or medical condition are advised to discuss their needs with [Access and Disability Resources \(ADR\)](#).

6. FINAL EXAMS: See [Student Assessments Policy](#) and [Grading Policy](#). Students are responsible for confirming the date, time, duration and location of the final exam.

7. LATE ASSIGNMENT (including laboratory assignments): As due dates for assignments are known well in advance, medical and other excuses are generally not accepted as a reason for submitting late assignments.

8. RE-EVALUATION OF MARKS

MacEwan [Grading Procedure](#) (Section 3.8) states that if a student feels an error has been made on the evaluation of submitted course work, the student is required to first contact the Instructor, via email, within four (4) business days of the mark being released. The Instructor shall respond within four (4) business days. If unresolved and the student has reason to believe the mark has been unfairly assessed, then the student may apply for a reassessment for any submitted assessment, which constitutes at least 10% of the final course grade. Requests for reassessment must be submitted to the applicable Department Chair (or designate) within four (4) business days of the Instructor sending a response to the student. The student must complete and submit the request form, available from the [Office of the University Registrar Forms Cabinet](#).

9. APPEALS: Please note anything that has its own appeals policy (e.g. [Student Academic Integrity Policy](#), [Grading Policy](#), [Student Non-Academic Misconduct Procedure](#) and [Academic Integrity policy](#)) is exempt from the [Student Appeals](#) policy. Students may contact [Student Affairs](#) for assistance.
<https://www.macewan.ca/about-macewan/administration/student-affairs/> [Student Affairs](#) for assistance.

INSTRUCTOR COURSE POLICIES/SUPPORT:

1. **Late penalties/procedures for missed exams or late assignments:** When students miss an exam, test, or quiz the instructor should be notified of the reason within 48 hours. Valid reasons for missing the exam include illness, jury duty or court subpoena, death in the family, or other emergency approved by the instructor. It is the student's responsibility to keep up with class work when they are absent from class. Absence from class will not be accepted as a legitimate reason for failure to attend an exam on time.

If a student misses a midterm because of illness or other circumstances approved by the instructor, then the student will receive an excused absence for the missed exam. The final exam mark (in percent) will then also be used as the midterm mark in the calculation of the final grade. If possible, the student must arrange this with the instructor before the exam, by emailing the instructor using the email address listed above.

Deferred Exams

2. **Attendance/Participation**

Students are expected to attend all lecture and lab sessions. Important course related information may be shared during the sessions.

3. **EXAMS:** Your student photo I.D. is required at exams to verify your identity. At the discretion of the instructor, students may or may not be allowed to begin an examination after it has been in progress for 15 minutes. Students must remain in the exam room for at least 20 minutes from the time the exam commenced. Consumption of food is not allowed during exams. Electronic equipment, other than calculators, is not to be brought to exams and hats should not be worn.
4. **ELECTRONIC DEVICES:** Cell phones and other electronic devices are to be turned off during lectures, labs, seminars, and exams (except under exceptional circumstances in which approval has been granted by the instructor). Laptop use is permitted only for taking class notes and/or following slides.

1. **GETTING HELP:** Students are responsible to seek out any assistance you need in the course. There are other university resources and supports that are available to help:

For technical support, contact techsupport@macewan.ca.

For m&skan&s support, contact dle@macewan.ca.

For psychological or emotional distress or anxiety, contact [Wellness and Psychological Services](#) 780-497-5063 WPS@macewan.ca or [Peer Support Services](#).

For Student Support (SAMU) see [Student Advocacy Centre](#) or [Student Resources](#)

For help with financial issues, contact [Fees and Financial Aid](#) 780-497-5025 or studentloans@macewan.ca

You may be eligible for a [scholarship, award, or bursary](#), click link for more information.

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DISCLAIMER:

The information in this course outline is subject to change and any changes will be announced in class or in writing.

Lecture Topics: All references are to material in Introduction to Categorical Data Analysis, Agresti (2007).

Week	Topics	Chapter
1 – 3 Sep 6 – 8, 11 – 15, 18 – 22	Introduction (Response/Explanatory, nominal/ordinal) Probability Distributions for categorical data (binomial, multinomial), Statistical inference for proportions, Likelihood function and Maximum Likelihood estimation, Test and confidence interval for binomial proportion, Wald, Likelihood ratio, and score inference	1.1 – 1.4
3 – 5 Sep 25 – 29 Oct 2 – 6, (Oct 2 Truth and Reconciliation Day observed – no classes)	Contingency tables Probability structure, comparing Proportions, Odds ratio, Chi-squared test, Independence of ordinal data, Inference for small samples, 3-way tables	2.1–2.7
6 – 7 Oct 9 – 13, Oct 16 – 20 (Oct 9 Thanksgiving Day observed – no classes)	Generalized Linear Model (GLM) Components, for binary data, for count data, statistical inference and model checking <i>Midterm Exam, Friday, October 20</i>	3.1–3.4
8 October 23 – 27	Logistic Regression Interpretation, Inference, categorical predictors, Multiple logistic regression, summarizing	4.1 – 4.5
9 – 10 Oct 30 – Nov 3 Nov 6 – 10 (Reading Break Nov 13 – 17, no classes)	Model building in Logistic Regression Strategies in model selection, Model checking, Sample size and power	5.1 – 5.2, 5.5

11 – 12 Nov 20 – 24, 27 – Dec 1,	Loglinear models The loglinear model, inference, independence graphs, modeling ordinal association	7.1 – 7.5
13 Dec 4 – 8	Review	

Homework Assignments

Students will have to hand in solutions for assignments every other week. Some of the homework assignments involve the analysis of data, which might require the use of a calculator or computer. Please see each question for which tool is admissible for that question.

1. All assignments will be submitted through Crowdmark (you scan and submit online)
2. **Very important:** Late assignments will **not** be accepted.
3. When you receive back the marked assignments check if you have any concerns with the marking. If you have concerns, please bring them to my attention. I will either explain the rationale or amend your record on my mark sheet.
4. Solutions will be posted after the due dates. Please make a habit of checking your solutions, even if the marker assigned you a perfect score. This will serve not only as a review, but it may possibly also bring to your attention an alternate approach to solving problems and may even identify, to your advantage, the situation where the marker may have given you credit for an incorrect solution. This is very rare, but this knowledge will spare you from losing valuable marks in examinations, and also serve as your personal quality control device.

Using SPSS for data analysis (Labs)

Calculators and computers are indispensable tools for statistical analyses. A computer is essential when analyzing large data sets or when using complex statistical procedures. In the labs, you will be using the SPSS software package for data analysis. SPSS is one of the most frequently used statistical software packages. With a little practice, you can perform the complex calculations needed for statistical analyses of large sets of data in a relatively routine manner. Before you start working on the lab assignment problems, you should first get familiar with the lecture materials and with the instructions included in the lab manual.