

# STAT 334 Fall 2022: Case Study Project

The case study in this course is intended to stimulate creative thinking and to develop the skills of independent modelling and analysis of real life problems. It includes:

- Choosing a topic of interest to you, building an appropriate Markov Chain model for your topic and, if necessary, locating appropriate data to build it
- Choosing appropriate statistical modelling techniques and providing evidence that the assumptions in the model hold, and providing conclusions on your analysis
- Effective written and oral communication of your process and results to a broad audience
- Working in teams
- The chance to demonstrate your skills to your peers and learn from each others' work

## Case Study Schedule

Case Studies will be done in teams of 3 or 4 students The deadlines for the case study are as follows. You have:

- **Until 11:59 pm on Sun Oct 30:** to form a team of 3 or 4 students and select a tentative topic. Let Diana know your topic, group members, and preferred presentation option. If you do not have a group by this time, groups will be created based on topic interest. You can use the Piazza tool to find a group as well.
- **Until 5:00 pm on Thurs Nov 17:** to have your case study presentation slides (and video if applicable) uploaded to Learn.
- **Until 11:59 pm on Sun Nov 20:** to have your report uploaded to Learn via the Dropbox.
- **Until 11:59 pm on Fri Nov 25:** to complete peer evaluations of other groups' videos and/or in-person presentations, and upload your individual case study reflection assignment. By this time you should also have completed your within-group peer evaluation.

If you make more than one submission before the deadline, only the most recent one will count. You are encouraged to submit a draft of any component early and get feedback from Diana on it.

## Marking Scheme

Item	% of Final Grade	Notes	Mark
Presentation	10%	evaluated by instructor and TAs	group
Peer Evaluation	5%	other groups' evaluations of your presentation and your own evaluations within group	group individual
Report	10%	evaluated by instructor and TAs	group
Reflection	5%	evaluated by instructor	individual
Total	30%		

# Case Study Presentation

There are two options for the case study presentation:

- **Option 1: In-person presentation**

The case study presentations will be held in on Thursday Nov 17 starting at 5:30 pm. All group members must participate in the oral presentation. Each group will be given 10 minutes for presentation and 3 minutes for Q/A (13 minutes in total).

- **Option 2: Video presentation**

Instead of a live presentation, you can submit a pre-recorded 10-minute video using the Video Assignment Tool on Learn. You can either record directly in tool using your own webcam or upload a video. For more information, please see <https://bongolearn.zendesk.com/hc/en-us/articles/360005085473-How-to-Complete-Group-Project>

I will give a couple of follow-up questions or suggestions to each group, which you are welcome to incorporate into your report.

You will need to view and evaluate other groups' presentations using the Video Assignment tool on Learn, by attending in-person presentations, or both. You will be using the knowledge gained from your classmates' presentations in your reflection assignment, the Oral Exam, and Test 2.

Your presentations will be graded on content (topic/assumptions/P matrix and analysis) and delivery (slides/organization and oral presentation)

# Case Study Report

The title page of your report should contain the topic of your project and names of the students in the team. The project should explain and justify all steps of your analysis. Include necessary references, program code and output (if any) to facilitate the reproducing of your results. The report should be 5 - 10 pages (approx 1250 - 2500 words), not including appendices (if any).

Your reports will be graded on the statement of problem and model, analysis performed, and conclusions, as well as general clarity and correctness of writing. Suggested structure:

- **Motivation and introduction of the problem:** Start with the problem. Describe the general aspects of your project, and why it matters to do what you have done in your project.
- **Markov Chain Model:** Define in detail how you will model your problem as a Markov Chain. Discuss whether the assumptions would hold in real-life situations. If you use data to find the probabilities, discuss how you did so.
- **Analysis:** Use your model to answer some questions of interest relating to your topic, including (but not limited to) the short term and long term behaviour, time to return to certain states, simulation of a sample path of the Markov Chain, etc.
- **Conclusions in the context of the problem:** Provide your findings in the context of your topic. For example, highlight the implications/interpretations that you have come to during your modelling process in the context of the case study. You should avoid technical (mathematical/statistical) language as much as possible in this part of the project, and make the conclusions accessible to a general audience.

## Within-Group Peer Evaluation

Each student should complete **one** very simple peer evaluation form and submit it on Learn. The peer marks are to make sure that all members of the team are fully involved in the case study and that the load is not carried by only some members of the team. The individual marks you provide for your teammates will be kept completely confidential.

## Case Study Reflection Assignment

The last part of the case study project is for you to think back on your experience of the case study and observing the case studies of other teams. This is an individual assignment and should not copy directly from your own report (or the reports of other groups.)

In approximately 2-3 pages (500-750 words total), please answer the following questions:

1. What did you find most interesting about your case study? Why?
2. What did you find most challenging about your case study? Why was it challenging? What might you do differently if you had a chance to do it again?
3. Choose 2 or 3 other groups, and for each one:
  - Briefly summarize their case study (problem only, you don't have to remember their model/conclusions)
  - What was the most interesting thing about it? Why?
  - What were the limitations/weaknesses of it (content, not presentation)? How could they be improved?

## Help with your Case Study

If you need help choosing a topic, building your Markov Chain model, or with the analysis, please visit Diana's office hours or make an appointment. Also, a TA from a previous term has prepared 2 documents giving some advice and guidelines for an effective case study, based on the most interesting/thorough projects in past terms.

If you need help working effectively in a team, please see the resources posted. In particular, having assigned roles and an agenda for each group meeting are extremely helpful. Have clear deliverables set for each meeting and communicate with your group members if you are having trouble with meeting any agreed-upon deadlines.

## Some Ideas for Case Study Topics

Music	Bond rating	Elevators	Wins/losses of a team	Lineups
Weather	Gambling	Genetics	Population growth	Election results
Taxis/Uber	Pizza Delivery	Machine status	Virus mutation	Molecular diffusion
Healthcare	Academic progression	Disease progression	or anything you like!	