

MATH 652: Multivariate Data Analysis

Final Project Guidelines

In lieu of a final exam, students will complete a final (data analysis) project, either individually or in groups (depending on class size) using the statistical methods discussed in class. Students may locate their own data to analyze, or search for a potential dataset from either the list of possible sites provided by the instructor or the data resource repositories available and referenced by the University resource librarians. Students will submit a project proposal and present a final in-class report both orally and in writing.

Final Project Proposal Information

You **MUST** submit a one- to two-page summary of your project idea (with a reference to the data source(s)), along with a preliminary list of questions you wish to address. Proposals are due by the stated deadline on Canvas.

Final Project Information

a. Final manuscript

Final projects should be:

- Typewritten (double-spaced, with 12pt font size)
- No more than 10 typewritten pages, not including the abstract, figures or tables.
- Figures and tables should be appended to the end of your manuscript.
- Written in report/article format:
 - **Abstract:** Motivate the problem(s), and summarize your work.
 - **Introduction:** Should include a statement of the project objectives and clearly state the scientific questions of interest.
 - **Methods and Materials:** Should include a brief description of the problem and the data (with reference to the data source(s)). This section can also include a quantitative and graphical summary of individual variables and relationships between variables of interest. Clearly indicate the methods applied and specific models considered (e.g., when conducting a hypothesis test, clearly state the null and alternative hypotheses in this section).
 - **Results:** Summarize the results as much as possible with clear reference to tables and figures. All tables and figures presented should have captions and be clearly referenced in the text.
 - **Discussion and Conclusions:** Summarize your project, clearly discussing your findings and conclusions. This section can also discuss any limitations of your study, and potential future work (if applicable).
 - **Bibliography:** Use a citation format appropriate for your discipline.

b. Final presentation

Final oral presentations will last no longer than the stated timeframe listed on Canvas. There will be time for a few questions.

Please use the article format noted above (Introduction, Methods and Materials, Results, Discussion and Conclusion) for your presentation as well.

Methodology and Data

You may find your own dataset, refer to the “Resource List for Potential Data” provided on Canvas, or utilize the data repositories made available by the University resource librarians for possible data resources.

Minimum guidelines for the data include a minimum sample size of 20 observations. Depending on the specific characteristics of a data set, these guidelines may need to be modified (e.g., a dataset containing 30 variables requires a sample size much larger than 20 to be viable for analysis).

The scope of the statistical methods required to analyze your data should contain two methods where at least one of the methods you will have learned in the course, e.g.:

1. Chapter 5: Inference about the Mean Vector
2. Chapter 6: Comparisons of Several Multivariate Means
3. Chapter 7: Multivariate Linear Regression Models
4. Chapter 8: Principal Components
5. Chapter 9: Factor Analysis
6. Chapter 10: Canonical Correlation Analysis
7. Chapter 11: Discrimination and Classification
8. Chapter 12: Clustering, Distance Methods, and Ordination

However, you are not limited to these methods for analysis. You may additionally consider analytical methods discussed in other statistics courses. Be creative!

You are required to check the assumptions and conditions for the methods you use and justify your choices. If the normality assumption is not reasonable for the standard methods above, consider analogous nonparametric methods where able, or proceed with the chosen statistical method noting that this is an exercise and explaining how the assumptions are not met.

Effort

You are expected to implement at least two methods in the analysis (where at least one of the methods was introduced in this course), and present your results and final conclusions.

Evaluation

Final presentations will be evaluated by the instructor and peers according to the following criteria:

- Clarity of presentation: can the audience understand what was done and why? Can the audience follow how the results from your analysis are related to the conclusion?
- Correct use of technique(s)
- Correctly reporting results
- Assumptions checked appropriately
- Thoroughness in terms of method(s) chosen and overall effort

Final manuscripts will be evaluated by the instructor in similar fashion.

For group project experiences, students will further complete an assessment survey regarding their partnership experience. If no survey is completed, the instructor will assume that their partners give an average rating across all questions requiring feedback.

Keep in mind that the emphasis will be on the appropriate integration of statistical methodology learned in this class as well as from classes you have taken in the past. Your manuscript should clearly explain what was done and the associated rationale.

Project Submission

Manuscript and presentation submissions must be submitted electronically on Canvas by the stated deadlines. **Manuscripts are to be submitted in Word or PDF format; presentations may be in PowerPoint or PDF format.** For both submissions, be sure to name your submission as “LastName(s)Paper” or “LastName(s)Presentation”, whether “.docx”, “.pptx” or “.pdf”, respectively (e.g. SellersPaper.docx, SellersPresentation.pptx, etc.).

Only one submission is required from each group. Make sure your project files include the names of all group members. **No alterations are allowed to either the manuscript or presentation files after the deadline.**

Deadlines

See Canvas for relevant project deadlines. **Late project submissions will not be accepted under any circumstances.**

Other notes

- You are encouraged to be creative in your data analyses!
- The organization of your report is very important. Points will be subtracted due to lack of organization in your report.
- You are free to choose the methods and options used in your analyses, however, you are expected to justify those choices.