

Grading Rubric

A. Meeting deadlines

	Exemplary	Satisfactory	Developing	Unsatisfactory
A1 Biweekly meetings		Attended all biweekly meetings with a prepared agenda.	Attended all biweekly meetings, but without a prepared agenda at most once per marking period or twice over the entire semester.	Otherwise.
A2 Report drafts		All report drafts completed and submitted on time.	All report drafts completed and submitted, missed deadlines at most once per marking period or twice over the entire semester.	Otherwise.
A3 Presentations		All presentations prepared on time.		Otherwise.
A4 Final report		Final report completed and submitted on time.		Otherwise.

B. Individual contribution

	Exemplary	Satisfactory	Developing	Unsatisfactory
B1	Biweekly contracts	Made substantial progress on assigned tasks from each biweekly contract.	Failed to make progress on assigned tasks on at most one biweekly contract per marking period or two over the entire semester.	Otherwise.
B2	Project involvement	Contributed to all aspects of the project: (1) formulation and analysis, (2) written report, (3) presentations.	Contributed to some aspects of the project.	Otherwise.
B3	Peer evaluation	All group members believe that you gave your best effort to provide a fair and meaningful contribution to the project.	At least one group member has expressed concern about your effort to contribute to the project.	Otherwise.

C. Written report - content

		Exemplary	Satisfactory	Developing	Unsatisfactory
<i>Introduction</i>					
C1	Background and motivation	Provides relevant and complete background on the system being studied. Describes concrete issues with the system that the project addresses.	Provides relevant background on the system but with some minor gaps. Describes issues with the system, but not enough detail to justify the purpose of the project.	Provides incomplete background on the system. Describes the issues in a vague or superficial manner.	Provides little or no background on the system. Does not describe meaningful issues with the system.
C2	Problem description and methodology	Describes a well-defined decision or prediction problem, the type of models and data used to analyze and solve the problem, and how the models and data will be used to generate results and recommendations.	Describes a decision or prediction problem, the models and data used, and their general role in generating results and recommendations, but some details are underdeveloped or not well-defined.	Describes a decision or prediction problem, but the problem is vague or not well-defined. Mentions models and data, but their role in generating results and recommendations is incomplete or unclear.	Does not describe a decision or prediction problem. Provides little or no discussion of models, data, or how they will generate results and recommendations.
<i>Data</i>					
C3	Basic description of data	For each data source, provides a complete description of where the data came from, their contents, and their size.	For each data source, provides a description of where the data came from and their contents, but some details may be missing.	Describes the data sources, but the descriptions are incomplete or vague, with key details about their origin, contents, or size missing.	Provides little or no meaningful description of the data sources, their origin, contents, or size.
C4	Exploratory data analysis	Describes exploratory data analysis. Provides summary statistics or histograms of key variables. Demonstrates the relationships between key variables with graphical visualizations. Provides correct distribution fitting analysis if appropriate.	Describes exploratory data analysis, but the discussion lacks some details. Provides summary statistics or histograms of key variables. Demonstrates the relationships between key variables with graphical visualizations. Provides distribution fitting analysis if appropriate, but with minor errors.	Describes exploratory data analysis, but lacks important details. Mentions key variables, but missing summary statistics, histograms, or visualizations of relationships for key variables. No meaningful discussion. Provides incomplete or incorrect distribution fitting analysis if appropriate.	Provides little or no description of key variable distributions or relationships between key variables. Does not include meaningful discussion or perform distribution fitting analysis if appropriate.
<i>Model</i>					
C5.1	Model description (regression)	States the type of regression model used. Describes the response variable and potential explanatory variables. Outlines the variable selection process with an appropriate level of detail. States the final regression model mathematically.	States the type of regression model used. Describes the response variable and potential explanatory variables. Outlines the variable selection process, but with too much or insufficient detail. States the final regression model mathematically, but with minor errors.	States the type of regression model used. Provides incomplete descriptions of the response and explanatory variables. Mentions the variable selection process, but with little detail. Incorrectly states the final regression model mathematically.	Does not state the type of regression model or provide meaningful descriptions of the response and explanatory variables. Does not outline the variable selection process or state the final regression model mathematically.

C5.2	Model description (optimization)	States the type of optimization model used. Describes all model components mathematically (sets, parameters, decision variables, objective function, constraints). Formats the model according to the standard convention. Describes the model components in words.	States the type of optimization model used and describes the model components mathematically, though a few details may be missing or incorrect. Formats the model according to the standard convention, but with minor errors. Provides a description of the model components in words, but with some minor gaps.	States the type of optimization model used, but provides an incomplete or incorrect mathematical description of model components. Model is not formatted properly. Provides a description of the model components in words, but with major errors or missing details.	Does not state the type of optimization model used or provide a meaningful mathematical description of model components. Does not describe the model components in words.
C5.3	Model description (simulation)	Provides a complete description of the flow of entities through the simulation model using a flow chart and in words.	Provides a description of the flow of entities through the simulation model with a flow chart and in words, but may miss minor details.	Provides an incomplete description of the flow of entities through the simulation model; the flow chart or written description is vague or missing important details.	Does not describe the flow of entities through the simulation model. Does not include or address performance metrics.
C6	Model correctness and complexity	Models correctly capture major features and some subtleties of the problem.	Models correctly capture the major features of the problem, but some minor subtleties may be overlooked or underdeveloped.	Models capture some features of the problem, but misses one or more key features.	Model is too simple or too complicated to give useful information.
C7	Model assumptions	Recognizes and correctly justifies all assumptions.	Recognizes and justifies key assumptions. Justifications may have some minor gaps.	Does not recognize or justify one or more key assumptions. Justifications have major errors.	Does not recognize any key assumptions. Provides no meaningful justifications.
<i>Results</i>					
C8	Computational environment	Describes the key aspects of the computer used to run the model (CPU, memory, operating system). Describes the key software packages and programming languages used to implement the models.	Describes the computer used to run the models and the software packages and programming languages used to implement the models, but with a few details inaccurate or missing.	Provides minimal information about the computer, software, or programming languages used. Descriptions are vague with important details missing.	Does not provide a description of the computer, software, and programming languages used.
C9	Alternatives	Considers well-defined multiple alternatives (regression: variable selection, done in C5.1, optimization: different instances of sets and parameters, simulation: different scenarios). Provides a complete description of these alternatives.	Considers multiple alternatives, but the description of these alternatives has some minor gaps.	Considers multiple alternatives, but the description of these alternatives has major gaps.	Does not consider or describe multiple alternatives.

C10.1	Model outputs (regression)	Reports key regression outputs (e.g., estimated coefficients, p-values for tests of statistical significance, overall goodness-of-fit measures) of each final regression model in tables. Describes what the p-values and goodness-of-fit measures indicate. Provides relevant diagnostic plots and measures, and discusses whether the necessary conditions have been met.	Reports key regression outputs in tables of each final regression model in tables. Provides an explanation of what the p-values and goodness-of-fit measures mean, but with a few missing or inaccurate details. Includes relevant diagnostic plots and measures. Discusses whether the necessary conditions have been met, but with a few missing or inaccurate details.	Reports some but not all key regression outputs. Provides a flawed explanation of what the p-values or goodness-of-fit measures mean. Includes some but not all relevant diagnostic plots. Gives a flawed discussion of whether the necessary conditions have been met.	Does not report any key regression outputs. Does not include any diagnostic plots.
C10.2	Model outputs (optimization)	Reports the optimal value for each instance of the optimization model solved. Provides the optimal solution for each instance in a user-friendly format (e.g., table, map, graph).	Reports the optimal value for each instance of the optimization model solved. Provides the optimal solution for each instance, but not in a user-friendly format.	Reports optimal values and optimal solutions for some but not all of the optimization model instances solved.	Does not report any optimal values or optimal solutions.
C10.3	Model outputs (simulation)	Reports the number of replications and confidence level for experiments. Identifies well-defined performance metrics to evaluate the model and reports the results of all key performance metrics using tables and graphs.	Reports the number of replications and confidence level for experiments. Identifies performance metrics to evaluate the model, but some details are not well-defined. Reports the results of all key performance metrics, but not in a user-friendly format.	Mentions performance metrics, but defines them in a vague or superficial manner. Does not report number of replications and confidence level for experiments. Reports the results of some key performance metrics.	Does not report any key performance metrics.
C11	Interpreting outputs	Provides a correct and detailed interpretation of the model outputs that fully supports the overall goal of the decision or prediction problem. Identifies interesting trend or features in the outputs.	Provides a mostly correct interpretation of the outputs, with minor details omitted or minor flaws.	Provides a flawed interpretation of the outputs.	Does not interpret the outputs.
<i>Conclusion</i>					
C12	Summary of study	Restates the decision or prediction problem. Briefly summarizes the type of models and data that were used to analyze and solve the problem.	Restates the decision or prediction problem. Briefly summarizes the model and data used, with some minor details omitted.	Mentions the decision or prediction problem. Provides an incomplete summary of the models and data used.	Does not restate the decision or prediction problem. Does not provide a summary of the models and data used.
C13	Recommendations	Provides a reasonable and well-justified recommendation for action based on the results.	Provides a reasonable recommendation for action based on the results.	Provides a flawed recommendation based on the results.	Does not provide a recommendation based on the results.
C14	Limitations and extensions	Identifies multiple key limitations resulting from modeling assumptions, data collection, etc. and suggests reasonable extensions to address these limitations.	Identifies one key limitation resulting from modeling assumptions, data collection, etc. and suggests reasonable extensions to address this limitation.	Does not identify at least one key limitation of the study. Does not address how the study can be extended to address the limitations.	Does not address any limitations of the study.

D. Written report - writing

		Exemplary	Satisfactory	Developing	Unsatisfactory
D1	Grammar, spelling, punctuation (GSP)	Text contains no GSP errors.	Text has a few minor GSP errors.	Text has serious GSP errors or a distracting number of minor GSP errors.	Text is not understandable in current form due to GSP errors.
D2	Organization	Report organized into sections as taught in class. Ideas within all sections are presented in a logical order.	Report organized into sections as taught in class. Ideas within most sections are presented in a logical order.	Report organized into sections as taught in class. Ideas in individual sections are not organized.	No organization present in the report.
D3	Clarity	Text is clear and concise.	Text is clear and readable for the most part.	Text is wordy or awkward.	Text is unclear.
D4	Tone	Text is professional.	Text is mostly professional, with a few minor informalities (e.g., cliches, slang, contractions)	Text is informal in a number of places.	Text is informal throughout the report.
D5	Technical language	All technical language is used correctly. All mathematical symbols are correctly explained in words.	Most technical language is used correctly. Most mathematical symbols are correctly explained in words.	Many errors in technical language. Many mathematical symbols are not correctly explained in words.	Technical language is consistently incorrect or imprecise. Mathematical symbols are not explained in words at all.
D6	Citations and references	All sources are correctly documented. In-text citations and reference list follow APA style exactly.	Most sources are correctly documented. In-text citations and reference list have a few minor errors in following APA style.	Most sources are correctly documented. In-text citations and reference list do not follow APA style.	Fails to correctly document sources. In-text citations and reference list have major errors and do not follow APA style.
D7	Appearance and formatting (AF)	Report follows AF rules in style guide.	Report has a few minor AF issues.	Report has consistent AF issues.	Report has serious AF issues.

E. Presentations - content

		Exemplary	Satisfactory	Developing	Unsatisfactory
E1	Introduction	Describes a well-defined decision or prediction problem. Provides relevant background on the system being studied. Describes concrete issues with the system that need to be addressed.	Defines a decision or prediction problem, but some minor details are not well-defined. Provides background on the system being studied, but omits some minor relevant details. Describes the issues, but without some specificity.	Defines a decision or prediction problem, but the problem is vague. Provides incomplete background on the system. Describes the issues in a vague or superficial manner.	Does not describe a decision or prediction problem, provide relevant background, or discuss concrete issues with the system being studied.
E2	Data	For the primary data sources, describes where the data came from, their contents, and their size. Provides visualizations to effectively show basic information and key relationships in the data.	For the primary data sources, describes where the data came from, their contents, and their size. Provides visualizations to effectively show basic information about the data.	Identifies some of the data sources used, but provides limited information about their origin, contents, or size. Provides visualizations that do not effectively convey information about the data.	Does not describe the data used. Does not provide visualizations that convey information about the data.
E3	Model	States the type of model used. Describes all model components. Recognizes and justifies all key assumptions.	States the type of model used. Describes model components, with a few minor gaps. Recognizes and justifies most key assumptions.	States the type of model used. Describes model components, with major details missing. Recognizes some key assumptions. Does not justify key assumptions.	Does not state the type of model used. Does not describe the model components. Does not recognize or justify any assumptions.
E4	Results	Describes multiple well-defined alternatives considered. Presents model outputs effectively in tables, graphs, and other visualizations. Interprets the model outputs in a way that fully supports the overall goal of the decision or prediction problem.	Describes multiple alternatives considered, with some minor details missing. Presents model outputs in tables, graphs, and other visualizations. Interprets the model outputs, but with some minor details omitted or minor flaws.	Considers multiple alternatives, but the description of these alternatives has major gaps. Presents the model outputs, but not in an effective manner. Provides a flawed interpretation of the outputs.	Does not consider or describe multiple alternatives. Does not present the model outputs. Does not interpret the outputs.
E5	Conclusion	Provides a reasonable and well-justified recommendation for action based on the results. Identifies multiple key limitations of the study. Suggests reasonable extensions to address these limitations.	Provides a reasonable recommendation for action based on the results. Identifies one key limitation of the study. Suggests reasonable extensions to address this limitation.	Provides a flawed recommendation based on the results. Does not identify at least one key limitation of the study. Does not address how the study can be extended to address the limitations.	Does not provide a recommendation based on the results. Does not address any limitations of the study.

F. Presentations - presenting

		Exemplary	Satisfactory	Developing	Unsatisfactory
F1	Organization	Presents ideas in a logical order that the audience can easily follow. Sequences ideas in a way that tells a compelling story.	Presents ideas in a logical order that the audience can follow.	Presents ideas in a mostly logical order. Some ideas or transitions between ideas are hard to follow.	Overall sequencing of ideas is difficult to follow.
F2	Visual impact of slides	Slide design and font selection allow for easy reading. Main points are emphasized by minimizing unnecessary details and irrelevant information. Graphics and tables explain the main points effectively and enhance the presentation.	Slide design and font selection mostly allow for easy reading. Main points are clear but sometimes diminished by unnecessary details or irrelevant information. Graphics and tables are relevant and contribute to the presentation.	Slide design and font selection make reading often difficult. Main points are often diminished by unnecessary details or irrelevant information. Graphics and tables are sometimes unclear or irrelevant.	Slide design and font selection make reading consistently difficult. Main points are obscured by unnecessary details or irrelevant information. Graphics and tables are unclear, irrelevant, or completely absent.
F3	Grammar, spelling, punctuation (GSP)	Presentation slides contain no GSP errors.	Presentation slides have a few minor GSP errors.	Presentation slides have serious GSP errors or a distracting number of minor GSP errors.	Presentation slides are not understandable in current form due to GSP errors.
F4	Professionalism	Slide content, verbal communication, and personal appearance are professional and appropriate for the occasion and audience.	Slide content, verbal communication, and personal appearance are mostly professional and appropriate for the occasion and audience.	Slide content, verbal communication, and personal appearance are somewhat unprofessional and inappropriate for the occasion and audience.	Slide content, verbal communication, and personal appearance are unprofessional and inappropriate for the occasion and audience.
F5	Presentation style and delivery	Body language is relaxed; consistent eye contact with audience; clear voice with appropriate volume and modulation; does not read from notes or slides.	Body language is mostly relaxed; mostly consistent eye contact with audience; clear voice; mostly does not read from notes or slides.	Body language shows nervous tension; often avoids eye contact with audience; voice is often unclear; often reads from notes or slides.	Body language shows a lot of nervous tension; completely avoids eye contact with audience; unclear voice; only speaks while reading from notes or slides.