

Final Project Rubric

CS283 v0.6 12/3/2019

This is a required, independent project that provides students with the opportunity to build on knowledge that has been gained from lectures, assignments, and readings in the course. It challenges students to dig deeper into a topic that was covered in the course, or to enhance breadth by exploring adjacent topics. Each student is challenged to implement a recent technique from the academic literature and critically evaluate its performance.

Students will submit a written PDF report and a ZIP archive with code and data. The ZIP archive must include a `readme` text file that describes how to use the code to recreate the results that are in the PDF report. The report must include (at least) the sections: Introduction, Methods, Results, Conclusion, and References. If the project is being done with a partner, the majority of the report can be written jointly, but each team member will submit her/his own copy of the report with her/his own additional section, titled Contribution Statement, that contains short answers to these two questions: What did I contribute to this project? What did my partner contribute to this project?

A secondary component of this project is research, meaning that students are expected to *create knowledge*. This is typically done by: (1) evaluating the technique's performance in new experiments, with new data, and/or with new parameter variations; and/or (2) by proposing, implementing, and evaluating a novel extension or adaptation of the technique.

Finally, this project develops communication skills through the creation of a written report. The report should do five things well: 1) describe, in the student's own words, the motivation for the original work, taking into account the historical context and related work when it was published; 2) provide, in the student's own words and figures that are appropriate for a reader who has completed a course similar to CS283, an intuitive description of how and why the technique works; 3) describe what was implemented in the project and how; 4) describe how evaluation was performed and why; and 5) discuss the strengths and weaknesses of the technique.

In summary, the goals of this project are to teach students new, course-relevant knowledge (60%), to develop research skills (20%) and to develop communication skills (20%). The written report and submitted code are used to assess these goals according to the following rubrics. Note that while the demonstration of attained knowledge (60%) and research skills (20%) are assessed separately in these rubrics, it is not necessary to explicitly separate them in the report. In most cases, they will be presented in a manner that has them closely intertwined.

60%: Attained knowledge relevant to the course

Did students gain, assimilate, and apply knowledge relevant to the course? The report and code are used to assess this.

Topic	Weight	4 - Mastery	3 - Satisfactory	2 - Developing	1 - Unsatisfactory
Review of related solutions	20%	Detailed, complete and accurate characterization of related techniques from the academic literature at the time of publication. Written description is concise and insightful.	Complete and accurate characterization of related techniques from the academic literature at the time of publication.	Characterization of related techniques at time of publication is accurate but incomplete.	Incomplete and inaccurate characterization of related solutions at time of publication.
Written demonstration of attainment	40%	Convincingly showed correctness using mathematical analysis, numerical simulation, and/or experiments with synthetic and/or captured data. Written description is simultaneously complete and concise.	Showed correctness using adequate mathematical analysis, numerical simulation, and/or experiments with some synthetic and/or captured data.	Suggested correctness using partial mathematical analysis, numerical simulation, and/or experimentation with some synthetic and/or captured data.	Did not demonstrate that implemented techniques are correct.
Software implementation	40%	Complete implementation that executes and provides correct output for all of the critical components of the processing pipeline. Code is efficient and well-organized, and report includes a concise description of how to use it.	Complete implementation that executes and provides correct output for all of the critical components of the processing pipeline.	Partial implementation that executes and provides correct output for a substantial subset of the overall processing pipeline.	Code does not execute or is incomplete.

20%: Communication

How well did students communicate the details of their project? The written report is used to assess this.

Topic	Weight	4 - Mastery	3 - Satisfactory	2 - Developing	1 - Unsatisfactory
Structure	60%	The structure of the report provides a logical flow of content. Word choice and sentence structure precisely express the intended meaning in a professional manner.	Report is well structured and the wording conveys the intended meaning.	Report structure does not clearly present the problem and solution, but does contain most pertinent information. Some instances of unprofessional language or grammatical mistakes.	Report structure is incomplete and not cohesive, wording is unprofessional, or there are significant grammar mistakes.
Figures	20%	Data, diagrams, and figures are used to support statements, engage the reader, and actively enhance reader understanding.	Data, diagrams, and figures are used to support statements.	Data, diagrams, and figures are not adequately used to support statements.	Data, diagrams, and figures are used inadequately or are not present.
Reproducibility	20%	It is clear that the target reader could not only replicate the achieved results but build upon them.	The target reader could replicate the results with few surprises.	The target reader could replicate the results, but with substantial effort.	The target reader could not replicate the results.

20% Research skills

To what degree did students create knowledge relevant to the course? The written report is used to assess this.

Topic	Weight	4 - Mastery	3 - Satisfactory	2 - Developing	1 - Unsatisfactory
Identify research opportunity	30%	Identified a clearly-defined, interesting, and manageable unexplored aspect of the technique that is directly related to the project topic.	Identified a manageable open aspect that is related to the project topic.	Identified an aspect for exploration that is overly trivial, unanswerable, already explored in the original paper.	Did not identify an aspect of the technique for further exploration.
Conduct research	40%	Used appropriate mathematical and computational skills, along with correct and thorough analysis of data from simulation or experimentation, to answer the research question with minimal wasted effort.	Used mathematical and computational skills, along with analysis of data from simulation or experimentation, to answer the research question.	Partially answered the research question, using at least some mathematics, computation, or experimentation.	Proposed answer is absent or is unsupported by any mathematics, computation, or experimentation.
Critical discussion	30%	Provided meaningful conclusions that are adequately supported by the technical analysis, and provided a critical review of the analysis techniques that were employed	Provided conclusions that are supported by the technical analysis, along with some review of the analysis techniques that were employed	Conclusions are unsupported by the technical analysis, or the review of employed analysis techniques is present but incomplete.	Conclusions are absent, meaningless, or unsupported. The review of employed analysis techniques is absent.