W210 Synthetic Capstone Grading and Rubrics

# Overview

The course assignments have been selected to enable project teams to make and measure progress towards the completion of a capstone project. Their weight in the final grade is:

* **5% - Individual Project Proposal**
* **5%** - **Team Process Agreement**
* **5% - Team Project Plan**
* **10% - Presentation #1** - Focus on problem and impact
* **15%** - **Presentation #2 –** Focus on technical approach
* **20%** - **Presentation #3** – Focus on demo and results, lessons learned
* **20% - Web-based final deliverable**
* **20% - Participation** - class discussions and group project participation

The remainder of this document lists each deliverable and associated assessment criteria.

# Individual project proposal

Individual project proposals are graded on a pass/fail basis. To receive the passing full credit for the individual project proposal, each student needs to

* Post brief descriptions of three potential project ideas to Slack or the ISVC wall. These descriptions can be as brief as one paragraph but needs to clearly articulate the problem being addressed, who benefits from the problem being solved, and the approach being proposed, including any data source(s) that will be used. For all ideas, students should consider clarity, impact, feasibility and evaluation.
* Present one of these ideas informally to the class in the live session for Week 2
* Post a more complete description (1-2 pages) of the idea to Slack or the ISVC wall by the deadline in time to be considered for voting by their classmates.

# Team process agreement

Team process agreements are graded on a pass/fail basis. To receive the passing full credit for the team process agreement, each team needs to answer the questions posed in the agreement template in the Coursework section of the class material. Areas covered include preferred communication medium, expected response times, meeting schedule, expected hours per week each team member intends to devote to the project, conflict resolution process, and other mutual expectations of the team members regarding roles and responsibilities.

# Team project plan

Planning is crucial to capstone projects. This assignment focuses on planning the project, identifying important contextual information that will inform decisions and direct project work, and adequately scoping the project within the constraints of the available time and resources.

A template for the project plan is provided in the Coursework section of ISVC for the capstone course. Each section of the plan will be assessed as follows

## Problem Identification

* Problem is well defined and described in a manner that enables a scientific approach to solving (i.e., hypotheses or research questions are stated or implied).
* Articulates why this is an impactful, compelling problem to address, ideally quantifying the size of the opportunity along some measure.
* Identifies assumptions made around the problem/opportunity that will influence key elements and features to be built into the MVP.

## Value Proposition

* Clarifies the value the MVP would bring to the target customer segment.
* Articulates why this solution would be compelling to target customers or users.
* Explains how this solution improves upon and is differentiated from current alternative solutions and approaches.

## Use Case / Customer Segment

* Identifies a specific targeted customer or user segment for the MVP.
* Describes the use case enabled by the MVP for the target user segment.
* Includes a plan for identifying potential users or customers.
* Includes a plan for user validation, and MVP validation for the targeted segment of users.

## MVP

* Describes in detail the minimal viable product to be built.
* Precisely addresses how the MVP will test assumptions made about the problem and the value of the solution.
* Describes and discusses technical plans for the MVP (Technical aspects, rather than user interface / user experience: intended data science approaches, techniques, models, and features of the MVP.)

## Data sets

* Indicates data sets the project will use.
* Datasets are public.
* Discusses attributes and relevant metadata of planned datasets, and impact on complexity of exploratory data analysis.

## Project Management

* Team roles and responsibilities are articulated.
* Plans for work distribution, management, collaboration, scheduling, and communication within the team are clear.
* Plans for implementing development approaches and frameworks (e.g., Agile), and tools to be used are included.

## Technical Approach

* Describes methodologies and plans for initial exploratory data analysis to ensure data sets are sufficient and meaningful for problem solving.
* Discusses potential algorithms, models, approaches to be developed and built for the project.
* Identifies potential technical challenges of the project.
* Identifies resources, support, and other areas where help will be needed, and some initial thoughts on how to seek out that help.

# Presentation #1

The first presentation is intended to communicate to the audience that the problem selected is compelling and impactful, the team has a differentiated and effective approach, and the team is starting to make solid progress against a clear plan.

The presentation, generally 15 minutes long or less, should address:

* problem selection and identification;
* initial scope of the minimum viable product
* a discussion of any initial exploratory data analysis results or findings from market;
* audience research and validation; and
* project planning details related to required knowledge, skills, and resources
* any issues encountered so far

The presentation will be assessed according to the criteria below:

## Problem clarity

* Problem being solved is clearly articulated
* Beneficiaries and other stakeholders and existing pain points are specifically identified
* Team describes the complexity and challenge of the problem space, why this problem persists and why it has not already been solved.
* Since important problems are complex and would take longer than a semester to solve, the team should identify which aspect of the problem their solution will address
* If the problem will take multiple efforts to solve, some of which do not directly involve data science and thus beyond the scope of the capstone, those complementary efforts should be identified.

## Potential impact

* The ways solving this problem drive major impact for the target organization are listed.
* Team identifies what a successful project might look like, and what makes this project worthwhile (using personal, social, organizational, economical, etc., lenses).At least a rough estimate of the impact a problem solution could have is provided.
* The team identified others who are trying to solve this problem, and describes how the team’s solution could be better
* Team learning goals are listed.

## Feasibility

* Presentation persuades the audience that the project could realistically solve this problem.
* Data, ideally publicly and openly available, has been identified
* The team already has some knowledge or expertise and has identified what additional knowledge will be needed.
* Team has identified any additional resources required to succeed
* Team has considered potential privacy, ethical, or legal issues.

## Approach

* Team has presented at least a high level project plan.
* Presentation describes the progress made so far on the plan.
* Team is exploring and evaluating data quality and presents preliminary results of exploratory data analysis.
* Team is managing legal / ethical risks
* Team has at least a high level conceptual product architecture
* Team describes how it is building the data pipeline
* Team lists the modeling algorithms they are exploring
* Team presents any challenges uncovered to date

# Presentation #2

The focus of this assessment is on Planning and Decision Making, with a focus on technical approach. This presentation should indicate and discuss early work done on identifying and exploring data relevant to the project, and how information gained from early analysis informed decisions made by the team about the scope, methods and models that the team believes is a best path towards addressing the problem space they identified and articulated in their previous presentation. Teams will be assessed on their decision making: what options they explored, if their decisions are driven by data and evidence, and how well they can articulate the alignment of decisions and data, analysis, and contextual details of their problem space. Teams will also be assessed on their ability to articulate their plan for the work that remains in their project: What the final project will look like, how feasible it will be to implement their plan, what obstacles they may face, and what steps still need to be taken in order to achieve their MVP for the end of term.

Presentations are generally 12 minutes long with 3 additional minutes for Q&A and should address the following topics and is given full credit if it satisfies the criteria listed under each topic.

## Problem being solved

* Team reviews the customer / user problem being solved and why is it an important problem to solve
* Time reviews the market opportunity, the pervasiveness of the problem, and the size of impact if the solution is implemented
* Team describes the steps they have taken to validate their assumptions about the use case and benefits with their target market segment
* It is clear to the audience what the team is doing and why

## MVP

* Team describes the MVP and how the key features relate back to the approach and its differentiators? While a demo or detailed user interface discussion is not required for Presentation #2, the MVP should create a logical bridge to the next section.
* The audience understands what the team is building and what impact the product will have on the initial set of target end users or customers.

## Data and EDA

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* Data resources are clearly identified and are adequate for addressing the problem space and proposed solution (or have been identified as inadequate, and a plan to pivot has been introduced).
* Data exploration: Early data has been explored and insights from EDA have been identified that confirm approach or inform a pivot strategy.
* EDA is appropriate, complete, and informs decisions and plans for methods/models. (Note that some teams may be taking on a project space that requires more or less EDA, setting up data collection apparatus, etc.) Evaluation of this criterion are dependent on scope and details that vary project to project.

## Technical discussion

* Team presents the current overall architecture of the product
* Team presents the data pipeline.
* The modeling techniques being used or considered are presented
* The current modeling results are presented
* Team described the tradeoffs in different modeling techniques
* Team described how they will evaluate the model results.
* Team lists the challenges identified based on the results so far.

## Plan for the remainder of the project

* Plans and details for deliverable MVP are articulated. An indication of what the team intends to deliver (MVP format, scope) is included.
* Planned MVP is scoped properly - feasible and realistic in terms of scope of work and time left to implement plans.
* Team demonstrates thoughtfulness and care in identifying potential problems, contextual complications, and obstacles they may encounter (and how they might deal with those challenges, including seeking out feedback or domain expertise as appropriate).
* Provide an inventory of tasks completed, and tasks they believe they will take on in the remainder of the term, along with details of how and when they plan to accomplish these tasks.
* Team describes what help, if any, is needed to finish the project
* Presentation ends strong with a reminder of the benefits of the project if completed. This could be an elevator pitch.

# Presentation #3

The final presentation of the semester is the chance for the team to demonstrate what they have built and summarize the evaluation of the results, focusing on the elements that are most differentiating and important. The team has roughly 15 minutes to cover (with time for Q&A)

* Introduction of the team
* Problem and mission statement
* Impact - why does this problem matter
* Demonstration of the MVP
* Highlights of the technical approach
* Evaluation
* Recommendations/next steps
* Wrap-up
* Acknowledgements, including division of labor among the team members

The focus of the third presentation assessment is on the team’s ability to present a final, crystallized version of project framing (problem statement, mission statement, value proposition, and proposed solution), along with a demonstrable MVP that aligns with the project framing and serves as a implementation of the planned solution to the problem space the team has articulated. Teams will be assessed on the quality and completeness of the product they present, technical aspects of the work included in the product, their efforts in evaluating and ensuring that their project is a best effort in addressing the problem they articulated, and the lessons learned and articulated in planning and implementing the project. Specifically, the presentation will be assessed according the following criteria:

## Overall presentation

* Ideally, every member of the team has a speaking role in the presentation. Anybody who does not have a speaking role should have had a major speaking role in a previous presentation from the team.
* The presentation should demonstrate effective communication and comprehensive storytelling, strong understanding and implementation of technical knowledge, and strategic and critical thinking.
* Visuals are appropriate and of high quality.
* Attribution is provided for third party-content where it is used.
* Each presenter is clear, confident and energetic
* Presentation delivery seemed natural (as opposed to the presenters reading notes verbatim)
* Flow of the presentation and transition between presenters is smooth.
* Presentation structure and organization of contents allow the audience to understand sequence, process of project work, outcomes,and impact.
* Presentation drives key points home from the beginning to the end, connecting all elements of the presentation together
* Presentation strikes the right balance between business and technical components while enabling everyone to appreciate and remember the key takeaways
* The presentation inspires the audience, bringing them along the journey so they have both a solid grasp of the MVP as it relates to the core problem and a view of the long term potential of the project
* Presentation adheres to time constraints and allows sufficient time for Q&A
* The team is clear in their answers to questions from the audience

## Impact

* Project meets a precisely defined market need and provides a highly usable tool or insight to users to meet that need.
* Impact statement includes market size, number of users, quantification of potential level of impact that project can deliver now and in the future.

## MVP demonstration

* The final deliverable is complete and the solution is demonstrated (or in a state that is in line with plans detailed in previous presentation).
* Project offers a working minimal viable product with a completed set of features or results, given the defined problem and scope. Ideally the MVP is at or close to production readiness.
* Demonstration explains how the MVP works and the product value to users., illustrates why the product aligns to the mission, and shows how and why does the MVP provide the initial solution to the target problem
* User experience (interface, outcome, etc.) has been thoughtfully addressed in design and implementation of MVP.

## Highlights of the technical approach

* Summary of technical approach (models, tech stack, pipeline, other technical considerations) is provided.
* Presentation includes the motivation, and assumptions applied to choose and optimize the implementation path.
* Discussion includes challenges that were overcome, key learnings that are interesting and potentially generalizable to other problems.
* Presentation includes the inputs and outputs of the model

Presentation shows how the output and insights become externalized to end users.

* Presentation describes the tradeoffs of the models and algorithm(s) used for the specific problems
* Presentation highlights what has worked well, key challenges overcome,and key learnings that are interesting and potentially generalizable to other similar or adjacent problems, ideally 3-5 technical key takeaways that are important for the audience to learn and remember..

## Evaluation

* Team demonstrates a clear set of steps taken to validate and evaluate modeling approach, techniques, and results from the project
* Both technical model evaluation and user feedback are addressed.
* For technical model evaluation, the presentation describes the approach and actions taken to evaluate the performance of the model(s), as against state of art / alternative implementation for the same or similar problems, as well as key learnings.
* Model interpretability. Is assessed
* Evaluation addresses how well the solution conforms to constraints likely to occur in context of deployment (e.g. infrastructure in developing countries)
* Presentation includes some evaluation of solution effectiveness based on user feedback and testing, describes the approach and key learnings, and whether the user feedback changed or didn’t change the assumptions and MVP.

## Recommendations and next steps

* Presentation should give recommendations if more resources and time were available. Where would you continue to invest time to develop and refine
* Presentation considers the perspective of the product manager not just the purely technical view.
* Presentation includes key takeaways that others could apply to similar or adjacent problems
* Presentation describes the key milestones on your product roadmap if development continued

## Wrap-up

* Wrap-up concisely reviews the mission, problem statement,impact, differentiation.
* Wrapup emphasizes the 3-5 key points about the project the team would like the audience to take away
* Presentation (possibly in appendix) includes a division of labor among the team members and acknowledgements of outside help received

# Web-based final deliverable

Completing the Web-based final deliverable, and uploading it to the MIDS program website, is a requirement for this course. For most projects, the final deliverable will explain the work in detail and showcase its interactive functionality. For projects without interactive functionality, it is sufficient to explain the work and showcase the results. Students are required to share all working code with their instructors and are encouraged to incorporate key examples into their deliverable. Examples of past projects can be found here:<https://www.ischool.berkeley.edu/programs/mids/capstone>. Upload instructions for the final deliverable can be found here:<https://www.ischool.berkeley.edu/intranet/students/mids/capstone>.

The website deliverable will be assessed according to the following criteria

* The website offers highlights of the project covered in the final presentation. Usually, the website includes: problem statement, general overview of the product and value proposition, link to or request for additional technical details (github link, Jupyter notebook, etc), link to demo (if it is on another site) or recording, and team and advisors. Sometimes, students have included a call to action on the website (e.g., “sign up for the newsletter,” “contact us,” “complete our survey,” “attend our webinar”)
* The website ideally offers some capability where users might be able to observe the operation of the solution on input and data they supply. The solution should perform basic error checking and validation of the user input.
* The website may include additional detail and/or links to information about the technical approach or evaluation..
* If the solution is a mobile application or real-time embedded application that requires sensor input and doesn’t lend itself easily to direct interaction in the context of a website, a recording or screenshots may be used to demonstrate the application.
* Code should be commented and well structured, and should be written modularly to be generalizable when possible.
* The website demonstrates best efforts to make it mission-driven, clear (in terms of communication), clean, functional and well organized, and as a showcase for your cumulative work.
* The deliverable supports a reasonable user experience and graphic design elements However, it is not necessary to spend a significant amount of time designing the website. A simple website utilizing existing web design templates from the Github Page or any free resource is fine. See the sample deliverables from previous semesters in the gallery.
* The deliverable does not require previous familiarity with the problem to be understandable.
* The web deliverable demonstrates strong tactical and strategic thinking and implementation to lead web site visitors and users to understand,appreciate, and engage with the project and call-to-action.
* In addition to the main deliverable, a project summary must be uploaded to the Berkeley iSchool website before the end of the semester.

# Participation

We believe in the importance of the social aspects of learning: between students, and between students and instructors, and we recognize that knowledge-building is not solely occurring on an individual level, but that it is built by social activity involving people and by members engaged in the activity. Participation, teamwork, and communication are key aspects of this course that are vital to the learning experiences of you and your classmates.

The criteria for assessing participation will be

## Live session attendance

* The student has attended at least 12 of the 14 live sessions, joining the session on time, and staying through the end
* Attendance grades will be adjusted downward for this component proportional to the number of classes missed if fewer than 12 sessions are attended.
* Students are expected to remain on video unless there are temporary constraints preventing them from doing so. There should be no recurring issues with connectivity, audio quality or background distractions.
* Advance notice should be given if the student is unable to attend a live session.

## Active contribution in live sessions and project teams

* Within live sessions, students are expected to participate in discussions, asking and responding to questions, whether on audio or on chat.
* During presentations, students are expected to provide constructive, specific feedback to other teams when they are presenting.
* Students are expected to participate in the peer evaluations conducted once in week 7 and once in week 14. Although the feedback will not be directly shared with teammates to preserve anonymity, honest assessments with specific, constructive suggestions for improvement are expected. The peer feedback questions include
  + Do you feel that the student contributed to a fair share of the workload?
  + Did the student meet the deadlines set forth by the team?
  + Did the student attend team meetings and contribute effectively during team meetings?
  + Did the student resolve any conflicts in a professional manner?
  + Did the student contribute in developing, maintaining, integrating and communicating project deliverables?
  + Would you work with this person again given an opportunity to do so?
  + Any additional comments for this person?
* If contribution issues are identified by the instructors through direct observation or the peer evaluation process, students are expected to address constructive feedback when it is offered.