UNIVERSITY OF SAN FRANCISCO | College of Arts and Sciences

<Computer Science/Master's of Science and Bridge>

ASSESSMENT REPORT
ACADEMIC YEAR 2022 – 2023

I.   LOGISTICS

1. Please indicate the name and email of the program contact person to whom feedback should be sent (usually Chair, Program Director, or Faculty Assessment Coordinator).

   EJ Jung, ejung2@usfca.edu, Faculty Assessment Coordinator of CS dept.

2. Please indicate if you are submitting report for (a) a Major, (b) a Minor, (c) an aggregate report for a Major & Minor (in which case, each should be explained in a separate paragraph as in this template), (d) a Graduate or (e) a Certificate Program

   (d) Graduate, both Master's program and Bridge Program.

3. Please note that a Curricular Map should accompany every assessment report. Has there been any revisions to the Curricular Map?

   No changes were made. The curricular map is attached.

II. MISSION STATEMENT & PROGRAM LEARNING OUTCOMES

1. Were any changes made to the program mission statement since the last assessment cycle in October 2020? Kindly state "Yes" or "No." Please provide the current mission statement below. If you are submitting an aggregate report, please provide the current mission statements of both the major and the minor program

   No changes were made.

   The mission of the MS in Computer Science graduate program is:

To provide students a strong theoretical background in computer science and deep technical programming skills by focusing on one-on-one student interaction and fostering the unique capabilities of each student.

Our mission statement coincides with the university mission to give students the knowledge and skills needed to succeed as professionals, and we are sensitive to the needs of our extremely diverse student population.

2. Were any changes made to the program learning outcomes (PLOs) since the last assessment cycle in October 2020? Kindly state "Yes" or "No." Please provide the current PLOs below. If you are submitting an aggregate report, please provide the current PLOs for both the major and the minor programs.

No changes were made.

Master's Program PLO

Students who graduate with a MS in Computer Science will be able to:
- Demonstrate advanced knowledge in a breadth of topics in computer science, including theory, systems, and development.
- Master at least one area of specialization in computer science. Demonstrate ability to independently solve advanced problems in academia or industry.
- Demonstrate ability to independently solve advanced problems in academia or industry.
- Demonstrate the ability to develop, learn and apply state-of-the-art technologies in computer science.

Bridge Program PLO

Students who pass the bridge program and proceed to the MS in Computer Science will be able to:
- Application: Implement medium- and large-scale programs in a variety of programming languages
- Theory: Explain and analyze standard computer science algorithms

- Systems: Describe the interactions between low-level hardware, operating systems, and applications

3. State the particular Program Learning Outcome(s) you assessed for the academic year 2021-2022.

Demonstrate mastery in at least one area of specialization in computer science.

III. METHODOLOGY

Describe the methodology that you used to assess the PLO(s).

Among many specializations in Computer Science, we focused on Artificial Intelligence (AI) this academic year. We use CS 686-02 Intro to AI taught in Spring 2023.

Course Learning Outcome

In CS 686-02, students are asked to acquire knowledge concerning a wide variety of topics concerning artificial intelligence. The course learning outcomes are:
Student will be able to:

- Describe standard AI approaches to problem solving, select the appropriate approach for a task, and explain their design decisions.
- Incorporate off-the-shelf toolkits to solve common real-world AI problems.
- Implement intelligent agents that exhibit goal-directed behavior.
- Characterize different types of learning problems, prepare datasets for learning, and evaluate an agent's performance on a learning task.

Mastery of Learning Outcomes

Mastery of these outcomes is assessed through a series of seven take-home assignments, each of which contain problems that address the learning outcomes above.

In the assignment chosen for assessment, students were asked to:

- Demonstrate their understanding of discrete probability and probabilistic inference.

- Implement a probabilistic machine learning algorithm (Baysian classfier), including selecting the appropriate features, cleaning data, and measuring performance.
- Understand and implement this classifier themselves, including making significant design decisions using *sklearn* (Python library).
- Use an off-the-shelf Natural Language Toolkit (NLTK) to extract knowledge from documents.
- Learn and apply off-the-shelf tools to this problem, including analyzing and comparing results.

Grading Rubric

This assignment consists of four questions, each with multiple parts, comprising a total of 100 points.

- Question 1 consists of a set of questions on discrete probability - students are assessed both on their ability to answer the questions and also their ability to derive the answers.
- Question 2 asks the students to implement k-means clustering. Students are assessed on the correctness of their algorithm, the quality of their presentation, and their design.
- Question 3 asks the students to implement the Naive Bayes algorithm. Students are assessed on the correctness of their algorithm, the quality of their presentation, and their design. They are also asked to compare the performance of their algorithm to *sklearn*, and are assessed on the quality of their writeup.
- Question 4 asks the students to use NLTK to extract named entities from text. They are assessed on their ability to complete the task. They are then asked to evaluate the output, and are assessed on their understanding of the problem.

IV. RESULTS & MAJOR FINDINGS

What are the major takeaways from your assessment exercise?

Level	MSCS Students	Bridge Students
Complete Mastery of the outcome	90.5% (19/21)	89.5% (17/19)

Mastered the outcome in most parts	9.5% (2/21)	10.5% (2/19)
Mastered some parts of the outcome		
Did not master the outcome at the level intended		

Results (Graduate):

Over 90% of students (19 out of 21) were able to show complete mastery of this learning outcome. The rest of the students (2 out of 21) were able to master the outcome in most parts.

Among 21 Master's students who took CS 686-02 in Spring 2023, 19 students were in the Bridge program. Most of them, 17 out 19 students achieved the complete mastery, and 2 students achieved the mastery in most parts. While this is slightly lower than the MSCS students, we find the performance comparable.

V. CLOSING THE LOOP

1. Based on your results, what changes/modifications are you planning in order to achieve the desired level of mastery in the assessed learning outcome? This section could also address more long-term planning that your department/program is considering and does not require that any changes need to be implemented in the next academic year itself.

Both MSCS and Bridge programs' assessment were positive and the feedback is shared with the department chair and the instructors. We will revisit the feedback when we evaluate the same PLO next time.
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2. What were the most important suggestions/feedback from the FDCD on your last assessment report (for academic year 2021-2022, submitted in October 2022)? How did you incorporate or address the suggestion(s) in this report?

First of all, we appreciate the FDCD taking time to review the reports and provide the feedback. The feedback from AY 2021-2022 was that we should compare the Bridge

program students' performace to the MSCS students' performance using a course later in the program. We used an elective course based on this feedback.

ADDITIONAL MATERIALS

(Any rubrics used for assessment, relevant tables, charts and figures should be included here)

Assignment 4: Learning and NLP (7302837)	Final Score	GR/Bridge
98	89.51	Bridge
100	100	Bridge
100	95.9	Bridge
95	91.8	Bridge
96	97.54	GR
94	97.21	Bridge
100	99.18	Bridge
100	97.54	Bridge
80	94.43	Bridge
100	99.67	Bridge
100	100	Bridge
99	99.84	Bridge
100	97.7	GR
98	96.39	Bridge
99	99.02	Bridge
100	81.15	Bridge
100	100	Bridge
99	96.39	Bridge
100	99.34	Bridge
100	99.67	Bridge
86	92.13	Bridge