College of Science and Mathematics Department of Mathematics

B.S. in Mathematics

Student Outcomes Assessment Plan (SOAP) 2024-2029

I. MISSION STATEMENT

The Bachelor of Science program of the Department of Mathematics at California State University, Fresno offers a high quality educational experience to students at the Bachelor’s level that matches the breadth and excitement of modern mathematics, develops important concept knowledge, emphasizes critical thinking and problem solving skills, and prepares students for the vast array of career opportunities for which mathematics is the foundation. The mission of the department is to provide an inclusive learning environment, where students from all backgrounds can obtain the modern and comprehensive mathematics education required for life and work in our technologically advanced and diverse society.

II. GOALS AND STUDENT LEARNING OUTCOMES

**Goal A.** Knowledge of Mathematics. Students will gain understanding and conceptual background knowledge of the core areas of mathematics. They will acquire the capacity to solve a variety of advanced mathematical problems; read, understand, and write rigorous mathematical proofs; and develop computational schemes to analyze data and solve problems.

Graduates will be able to:

A1. (CALC) describe and apply definitions of derivatives and integrals to solve problems

involving limits, derivatives, integrals, the Fundamental Theorem of Calculus,

optimization, infinite series, multi-dimensional derivatives and integrals, Green’s

theorem, Stokes’ theorem, differential equations, and eigenvectors.

A2. (CORE) describe, apply, and use the definitions of the following concepts to prove their fundamental properties in advanced mathematics: logic, sets, functions, matrices, vector spaces, groups, rings, fields, continuity, sequences, limits, series, derivatives, and integrals.

A3. (PROG) develop, implement, and use computer programs in languages such as MATLAB, Maple, Mathematica, R, SAS, and Python to analyze data and solve mathematical and/or statistical problems.

**Goal B.** Communicating Mathematics. Students will learn to effectively communicate mathematical ideas through writing and presentations. Graduates will be able to:

B1. (WRIT) write a professional and technical report on an independent study in mathematics with proper mathematical style and formalism using the LaTeX typesetting system.

B2. (PRES) discuss and present on a mathematical topic, including creation of presentation slides.

**Goal C.** (JEDI)Graduates from *all backgrounds* will meet the above listed program learning outcomes.

III. CURRICULUM MAP (MATRIX OF COURSES *×* LEARNING OUTCOMES)

For courses in the major, we will use the abbreviations below to indicate which outcomes are introduced, which are reinforced, which are emphasized, and which are mastered in that particular course.

I = Introduced R = Reinforced E=Emphasized M=Mastered

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Goal/SLO | Introduced (I) | Reinforced (R) | Emphasized (E) | Mastered (M) |
| A1 (CALC) | MATH 75 | MATH 76  | MATH 77 | MATH 81 |
| A2 (CORE) | MATH 152 | MATH 111 | MATH 151/171 | MATH 151/171 |
| A3 (PROG) | MATH 105/120 | MATH 106/121 | MATH 122 |  |
| B1 (WRIT) | MATH 111 | MATH 123 | MATH 190/198 |  |
| B2 (PRES) | MATH 111 | MATH 145 | MATH 193 | MATH 190/198 |

Note: SLOs B1 and B2 may be assessed in most courses at the discretion of the instructor and assessment committee.

IV. ASSESSMENT METHODS

A. Direct Measures:

1. Embedded questions on exams, midterms and/or finals on a rotating basis. We will do this for at least two courses per year.

2. For the culminating experiences, we will use rubrics to assess senior projects and presentations. These will be completed by instructors and/or mentors, and given to the assessment committee for analysis.

B. Indirect Measures:

4. We will administer and collect surveys, reflections, and polls.

(a) Senior exit surveys, and focus groups with graduating seniors in which topics in the senior survey are discussed.

(b) Alumni and employer surveys.

(c) Reflections and other similar surveys/polls given in courses, such as MATH 143 and MATH 149S.

(d) Data on Graduation rates, Retention rates, and pass rates.

The results of these surveys will be reported annually, while aggregated survey results will be analyzed every five years.

VI. TIMELINE

**Each semester:**

* Direct assessment of MATH 111 by embedded questions on exams and assessment of student presentations.
* Direct assessment of projects in MATH 190, 198 by advisors of undergraduate research projects.
* Direct assessment of student research presentations in MATH 193 seminars and colloquia.
* Indirect assessment of graduating students via surveys and exit interviews.

**Fall Even Years:**

* Direct assessment of MATH 152, MATH 151, and in alternating even years, MATH 120 and MATH 145.

**Spring Odd Years:**

* Direct assessment of MATH 171 and MATH 121.

**Fall Odd Years:**

* Direct assessment of MATH 105, MATH 122, and MATH 171.

**Spring Even Years:**

* Direct assessment of MATH 106, MATH 152, and MATH 151.

VII. PROCESS FOR CLOSING THE LOOP

The assessment committee will meet annually to review the results of the assessment activities and determine areas where curriculum changes may be necessary. The report detailing the review and recommendations will be forwarded to the department.

There will be an annual department meeting at the beginning of each academic year, dedicated exclusively to the discussion of the recommendations put forth by the assessment committee. If at that time the department decides to act on the committee’s recommendations, ad hoc committees will be created to implement them. The results and outcomes of each ad hoc committee’s work will be included in the following year’s assessment report.