Annual Program Report
2024-2025

(For programs not using Planning & Self Study software for the annual report)

The report(s) should be inclusive of all levels, degrees (i.e. certificates, bachelor's and master's), modalities and locations.

Department: Mathematics

Department Chair: Peter Staab

Department Assessment Committee Contact: Jessie Oehrlein

This document is to be kept in the department and an electronic file is due to the AVP of Institutional Research and Planning by June 1, 2025.

Section I: Program Assessment (please complete this section for each program in your department)

Program: Mathematics

A. Program Learning Outcomes (PLOs) (Educational Objectives)

I. List of PLOs and the timeline for assessment

PLO #	PLO – Stated in assessable terms	Where are the learning outcomes for this level/program published?	Timing of assessment (annual, semester, bi-annual, etc.)	When was the last assessment of the PLO completed?
1.	Students should develop effective thinking and communication skills. a) state problems carefully, articulate assumptions, understand the importance of precise definition, and reason logically to conclusions; b) identify and model essential features of a complex situation, modify models as necessary for tractability, and draw useful conclusions; c) deduce general principles from particular instances; d) use and compare analytical, visual, and numerical perspectives in exploring mathematics; e) assess the correctness of solutions, create and explore examples, carry out mathematical experiments, and devise and test conjectures; f) recognize and make mathematically rigorous arguments g) read mathematics with understanding;	https://www.fitchburgstate.edu/academics/programs/mathematics-babs	(a)(c)(f)(h) – every other year (b)(d)(e)(g) -every other year (i)(j) – every 3 years (with PLO 4)	(a)(c)(f)(h) – AY 2023 and 2025 (b)(d)(e)(g) – AY 2024 (i)(j) – AY 2022 and 2025

	h) communicate mathematical ideas clearly and coherently both verbally and in writing to audiences of varying mathematical sophistication; i) approach mathematical problems with curiosity and creativity and persist in the face of difficulties; j) work creatively and self-sufficiently with mathematics.			
2.	Students should learn to link applications and theory. a) Mathematics students should encounter a range of contemporary applications that motivate and illustrate the ideas they are studying b) learn to apply mathematical ideas to problems in those areas. c) Students should come to see mathematical theory as useful and enlightening in both pure and applied contexts.	https://www.fitchburgstate.edu/academics/programs/mathematics-babs	Every three years	AY 2022 and AY 2023
3.	Students should learn to use technological tools. a) Mathematical sciences major programs should teach students to use technology effectively, both as a tool for solving problems b) Mathematical sciences major programs should teach students to use technology effectively, as an aid to exploring mathematical ideas.	https://www.fitchburgstate.edu/academics/programs/mathematics-babs	Every three years	AY 2025

	c) Use of technology should occur with increasing sophistication throughout a major curriculum.			
4.	Students should develop mathematical independence and experience open-ended inquiry. a) A mathematical sciences major should be structured to move students beyond the carefully choreographed mathematical experiences of the classroom. b) A major curriculum should gradually prepare students to pursue open-ended questions c) to speak and write about mathematics with increasing depth and sophistication.	https://www.fitchburgstate.edu/academics/programs/mathematics-babs	Every three years	AY 2024 and AY 2025

II. **PLO Assessment** (Please report on the PLOs assessed and/or reviewed this year. Programs should be assessing at least one each year.)

Using the table below, list and briefly describe the **direct method(s)** used to collect information assessing whether students are learning the core sets of knowledge (K), skills (S) and attitudes (A) identified as essential.

PLO # (from above)	Assessment description (exam, observation, national standardized exam, oral presentation with rubric, etc.)	When assessment was administered in a student program (internship, 4th year, 1st year, etc.)	To which students were assessments administered (all, only a sample, etc.)	What is the target set for the PLO? (criteria for success)	Reflection on the results: How was the "loop closed"?
#1(a)	Derivative definition homework Math 2300 (Calculus I)	Approximately 1st and 2nd year	All students in Math 2300	Judged at the level of the student, the criteria for success is a score of 2 (proficient).	We will report findings to the dept. in the form of a report at a department meeting.
#3	Homework Math 3550 (Methods of Applied Math) #5	Approximately 3rd and 4th year	All students in Math 3550	Judged at the level of the student, the criteria for success is a score of 2 (proficient).	We will report findings to the dept. in the form of a report at a department meeting.
#1(h)	Final project report Math 3003 (Advanced Statistics)	Approximately 3rd and 4th year	All students in Math 3003	Judged at the level of the student, the criteria for success is a score of 2 (proficient).	We will report findings to the dept. in the form of a report at a department meeting.
#1(j)	Final project report Math 3003 (Advanced Statistics)	Approximately 3rd and 4th year	All students in Math 3003	Judged at the level of the student, the criteria for success is a score of 2 (proficient).	We will report findings to the dept. in the form of a report at a department meeting.
#3	Final project report Math 3003 (Advanced Statistics)	Approximately 3rd and 4th year	All students in Math 3003	Judged at the level of the student, the criteria for success is a score of 2 (proficient).	We will report findings to the dept. in the form of a report at a department meeting.
#1(h)	Presentations in Math 4200 (Probability & Statistics I) and Math 3001 (Scientific Computation & Visualization)	2nd through 4th year	All students in Math 4200 and Math 3001	Judged at the level of the student, the criteria for success is a score of 2 (proficient).	We will report findings to the dept. in the form of a report at a department meeting.
#4(c)	Presentations in Math 4200 (Probability & Statistics I) and Math 3001 (Scientific	2nd through 4th year	All students in Math 4200 and Math 3001	Judged at the level of the student, the criteria for success is a score of 2 (proficient).	We will report findings to the dept. in the form of a report at a department meeting.

	Computation & Visualization)				

You may use this comment box to provide any additional information, if applicable:

PLO 1(a):
MATH 2300 Calculus I: There were 29 artifacts to assess. We considered three problems in which students needed to use precise definitions accurately. In the first problem, 12 students did so at a proficient level or higher; in the second, 9 did so at a proficient level or higher; and in the third, 19 did so at a proficient level or higher. Many solutions at a lower level found correct answers but did not use the requested definition or communicate it clearly or correctly. Other goals we assessed also noted weakness in communication skills (see below).

PLO 3:
MATH 3550 Methods of Applied Math: There were three artifacts to assess. In this assignment, use of technology was optional but extremely helpful to solve the problem. 2 out of 3 students used technology, largely appropriately for their level, with some weaknesses in efficient use and in communication of their work.

MATH 3003 Advanced Statistics: There were nine artifacts to assess. In this assignment, use of technology to explore and solve a problem was optional but very much expected. Eight of nine students used technology; seven used it to both solve their chosen problem and to explore statistical ideas at a proficient level or higher. All students were at least proficient in choosing an appropriate application, posing the problem or idea in an appropriate form for technology use, and choosing appropriate commands to use. Seven of the eight students who used technology to explore statistical ideas did so with a logical system of inquiry at a proficient level or above, and similarly seven of the eight interpreted their results correctly at a proficient level or above. Six of the eight were proficient or better in using technology efficiently. The major weakness was in communication. Only two and three out of eight students used logical argumentation and organization or communicated and presented their processes and conclusions in clear, easy to understand ways, respectively.

Across the two courses, the results may indicate that more emphasis, feedback, and cycles of revision to address communication of results found with technology are needed. More discussion and modeling of efficient use may also be helpful.

PLO 1(j):

MATH 3003 Advanced Statistics: There were nine artifacts for assessment. However, one student did not solve a problem as part of the project, and this artifact was considered not assessable for this PLO. All eight other students used techniques learned across multiple courses to solve a problem at a proficient or mastery level. Seven modified hypotheses for stronger results to some extent, but only three at a proficient level or above. Including more emphasis on iteration in mathematics and statistics would be beneficial based on these results. Developing stronger communication skills would also be helpful here, as sometimes it was the lack of clarity around initial hypotheses that led to lower ratings here.

PLO 1(h) and PLO 4(c):
MATH 4200 Probability & Statistics I and MATH 3001 Scientific Computation & Visualization: There were ten artifacts for assessment. All students in both classes were at least proficient in both non-content and content areas. Structure of the presentation, body language, and fluidity of delivery continued to be areas that would most benefit from work.

MATH 3003 Advanced Statistics: There were nine artifacts for assessment. The aspects of 1(h) considered here were (b), focused on writing, and (d), focused on audience; 4(c) was not assessed. Five of nine students communicated mathematical ideas clearly and coherently in writing at a proficient level or higher, and only two communicated appropriately for the audience at a proficient level or higher (both at a mastery level). As stated above, more emphasis, feedback, and cycles of revision for written communication in statistics would be beneficial here.

Summary of Findings: Briefly summarize the results of the PLO assessments reported in Section II above combined with other relevant evidence gathered and show how these are being reviewed/discussed. How are you “closing the loop”?

Reflection Prompt	**Narrative Response**
Other than GPA, what data/ evidence is used to determine that graduates have achieved the stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)	We have solicited assignments and other assessments from faculty in the department. Many faculty have provided us with artifacts we can use to evaluate whether students are achieving the PLOs set by the department.

Who interprets the evidence? What is the process? (e.g. annually by the curriculum committee)	The Departmental Assessment Committee consisted this year of three members of the mathematics department. We meet regularly during the year to evaluate the artifacts and compare our ratings with each other. That ensures inter-rater reliability of assessment.
What changes have been made as a result of using the data/evidence? (close the loop)	This year, the department proposed (and AUC approved) major revisions to the mathematics major designed to align with the Mathematical Association of America's recommendations and our PLOs. This was partially on the recommendations of the Assessment Committee over the past few years. In particular, all students will now take either MATH 3000 (Geometry) or MATH 3200 (History of Math), which will have a focus on communication, and all students will complete some form of capstone with a strong emphasis on communication, as well.

B. Assessment Plan for Program/Department

I. Insert the program or department Assessment Plan (This is an independent plan from what is reported in this document).

II. Explain any changes in the assessment plan including new or revised PLOs, new assessments that the program/department plans to implement and new targets or goals set for student success.

III. If you do not have a plan, would you like help in developing one? ___Yes

We plan to keep the current plan for the time being. The external reviewer last year did not suggest changes to assessment of our major, and we revised the major and concentrations this year to better align with the PLOs.

C. Program Review Action Plan or External action Letter/Report

Annual Reflection/Follow-up on Action Plan from last Program Review or external accreditation (only complete the table that is appropriate for your program

I. **Programs that fall under Program Review:**

i. Date of most recent Review: 2023-2024 Academic Year (April 2024)

ii. Insert the Action Plan table from your last Program Review and give any progress towards completing the tasks or achieving targets set forth in the plan.

Specific area where improvement is needed	Evidence to support the recommended change	Person(s) responsible for implementing the change	Timeline for implementation	Resources needed	Assessment Plan	Progress Made this year
Updating the major and the individual concentrations	We are using the MAA (Mathematical Association of America) for curriculum design. The two aspects of this that we are lacking is a statistics course in the major and including both breadth and depth of content in the major. This was pointed out by the external reviewer.	Curriculum Committee	2 years		After implementation, determine how well the new curriculum fits the MAA curriculum guidelines.	The Department submitted AUC proposals to update the curriculum. This was passed this year. Note: the middle school program was not changed and the intention is to do it next year.
Increase the number of majors/minors	We are well below the number of majors that we had in 2016 (about 55) and we have trouble teaching some courses at the upper level due to this. A goal of 40 majors would support multiple upper-level courses per semester.	Chair in conjunction with admissions/ marketing Departments.	5 years	Support from the Provost's office together with marketing and admission to increase the numbers of prospective majors.	Continue collecting data about the total number of majors from 2016 through the present and determine if the majors have increased as well as how well the total compares to the 2016 total.	None. This is a long-term plan
Diversifying the Offerings of the Department	We have had to shrink the number of classes offered because of the low number of majors. We would like to offer a few other classes at the 3rd and 4th year level to increase the desirability of the major.	Curriculum Committee and Department chair	5 years	Support from the HNS dean and Provost's office to allow such courses to be taught at full credit.	Collect data about the number and type of courses taught over the years and determine if the total number has increased.	Not done–longer term project and with curriculum reform done, this can now be examined.

Specific area where improvement is needed	Evidence to support the recommended change	Person(s) responsible for implementing the change	Timeline for implementation	Resources needed	Assessment Plan	Progress Made this year
Continued incorporation of internships in the major	Majors have been increasingly asking about internships over the past few years. Provide the information and resources to students to be able to sign up for internships.	Department Chair + internship coordinator + career services Department	2 years	Continued support related to internship information through handshake or other means.	Collect data about the total number of interns as well as placement company and other relevant data.	With the new curriculum just passed, internships are now an optional requirement for a capstone project.
Provide better pathways for middle level licensure	The state requirements for middle and high school level mathematics teachers have changed recently to lower the level of mathematical content needed. The desire is to increase the number of graduates who will teach in middle school and the Mathematics Department should create a Math Ed major that will increase the number of graduates.	Curriculum Committee	2-5 years	Support from the Provost's office to help out the Department at the state level to complete needed paperwork.	Determine if there is a new Middle School major within two years and after five years determine the total number of middle majors (as well as if they have jobs in schools).	None–plan to revisit next AY.
Formalize the Assessment of our Foundational and Service courses	The Mathematics Department recently performed an analysis of the effectiveness of the Foundational Mathematics courses and how students in these courses perform in their college-level courses. Additional assessment needs to be done at this level as well	Department Chair with support from the Provost's office.	4 years	Support from the administration to perform the assessment either through summer stipends or APRs.	Determine if additional assessments have been done. If so, we should also react to suggestions made in the reports about changes to foundational or college-level courses.	Amy Wehe had a APR to develop an assessment plan and is wrapping up this semester. Additionally, we received some SUCCESS grant funding to continue this work this summer.

Specific area where improvement is needed	Evidence to support the recommended change	Person(s) responsible for implementing the change	Timeline for implementation	Resources needed	Assessment Plan	Progress Made this year
	as the 1000-level for all service courses.					
Examine course coordination for multisection service courses	Partly from our Curriculum Committee there is a need to coordinate multi-section courses to ensure that the desired material is being taught in all sections.	Curriculum committee	3 years	none	Determine from the Curriculum committee if courses are sufficiently covering the desired material.	None.
Continue the effort of placing full-time faculty in gateway mathematics courses and increasing staffing as needed	Gateway course success is linked to having good teachers leading them and having full-time faculty with the focus and dedication on teaching at FSU is important.	Department Chair	1 year	Support from the HNS Dean and administration to ensure that we have a sufficient number of tenure-track and full-time faculty to cover all of the important mathematics courses.	Collect data and determine the total number and percentage of full-time faculty in gateway courses.	We recently successfully hired an assistant professor on tenure-track (welcome Fernando). He is fluent in Spanish and will be an important asset as we continue the University's drive to become a Hispanic serving institution. This position helps overall,, but will still evaluate our needs in the future.
Revisit the Department Mission Statement	The external reviewer indicated that the Department Mission Statement is a bit out of date and should be revisited.	Department Chair and Entire Mathematics Department.	2 year	none	Determine if the Department has revisited the Mission Statement.	None–will revisit next year.

iii. If you do not have an action plan, would you like help in developing one based on your last program review and needs of the program? _____Yes

II. Programs with external Accreditation: N/A

i. Professional, specialized, State, or programmatic accreditations currently held by the program/department.
ii. Date of most recent accreditation action by each listed agency.
Iii. Date and nature of next review and type of review.

List key issues for continuing accreditation identified in an accreditation action letter or report.	**Key performance indicators as required by agency or selected by program (licensure, board or bar pass rates; employment rates, etc.) (If required.)**	**Update on fulfilling the action letter/report or on meeting the key performance indicators.**

Section II - Departmental Outcomes

A. Departmental Strategic Initiatives

Accomplished Initiatives AY24-25 **Add more rows as needed**	**Corresponding Strategic Plan Goal & Strategy** **Goal # followed by Strategy # ex: 1.3**	**Indicate (X) if a Diversity, Equity and Inclusiveness (DEI) Goal**
Updated the mathematics Curriculum	1.5	

Hired a tenure-track professor	2.1, 2.2, 5.1	X
Create an assessment plan for our intro-level (Gen. Ed) courses.	1.1, 5.1	

Planned Initiatives for AY 25-26 **Add more rows as needed**	**Associated Strategic Plan Goal & Strategy** **Goal # followed by Strategy # ex: 1.3**	**Indicate (X) if a Diversity, Equity and Inclusiveness (DEI) Goal**
Revisit the Middle School Math program	1.2, 1.4, 5.1, 6.2	

B. Departmental Accomplishments and Reflection:

Take this section to reflect on--

1. *24-25 Accomplishments not captured above*
2. *Initiatives that you may be considering for 25-26 academic year that you did not already capture above*
3. *Any other thoughts or information that you would like to share*

The Department continues to be focused on using and developing OER materials. Many core courses continue to use OER (Math 1100, 1500, 1600, 1700 [some sections], 2300, 2400, 2600 and 3350) and quite a few upper-division courses as well. Additionally, faculty have been writing or rewriting OER materials include:

- Sarah Wright, who spent her Spring 2025 sabbatical on rewriting the Math 1100: Math and Society text that was previously written by FSU faculty. Sarah updated the text for newer material, using an interactive and accessible platform (PreText)
- Mary Ann Barbato, who completed her Math 1600: Informal Mathematical Modeling text that was part of the ROTEL grant. That text was used in class for the first time this year.
- Peter Staab continues to develop materials. His primary accomplishment this year was to readapt his Scientific Computation text to use PreText, given an easier to use and more-accessible platform for that course.

The Department continues to serve the university in many capacities both in terms of important committees and program area chairs:

- Peter Staab was a member of the All University Committee
- Sarah Wright was a member of the AUC - Curriculum committee (and Jessie Oehrlein took her place in the spring due to her sabbatical.
- Lori Leonard was a member of the AUC - Policy Committee
- Amy Wehe as a member of the Tenure Committee
- Gerald Higdon was a member of the Promotions Committee
- Catherine Buell was the director of the Honor Program this year (on leave for fall)
- Nermin Bayazit was a co-director of the Program Area in Secondary and Middle School education
- Nermin Bayzait was the Graduate Chair of the Master's in Education Program.

The Department continues to serve its current students (both majors and minors as well as others) in showing them the mathematics practiced in other academic and industry settings. Mary Ann Barbato and Fernando Diaz Morera served on the Department Seminar Committee. They had many events this year including:

- An Alumni Panel in October 2024 with Jared Weed ('13), Maggie Chase ('24), Hannah Vella ('14), Mark Maggio ('09)
- *Graph Theory and Cellular Networks: What's the Connection* by Mary Ann Barbato (FSU)
- *Math in the Sky: From Winter Weather to Future Climate!* by Jessie Oehrlein (FSU)
- *The Ubiquity of Pattern Avoidance in the Symmetric Group* by Fernando Diaz Morera (FSU)
- *Multi-Fidelity Modeling of a Traumatic Brain Injury* by Charlie Fisher (ARA, FSU alum '08)
- *Mathematical Modeling Applications in the Life Sciences* by Kristen Windoloski (Computational Scientist, FDA, FSU alum, '18)

- *Cryptography for Cybersecurity* by Cynthia O'Brien (DoD-NSA retired Senior Systems Engineer and FSU math alum, '85)
- "From Math Major to Data Analyst: What Can You Actually Do With a Math Degree?" by Oliver Titus (Senior Biostatistician, University of Colorado Skaggs School of Pharmacy and FSU alum, '20)
- *Colored Tilings on Graphs* Diego Villamizar Rubiano, Assistant Professor, Xavier University

The Mathematics Department inducted seven students (Evan Pritchard,Joseph James, Emily Pryer, Mackenzie Dodge, Tyrian Hobbs, Nathan Malicki, Aidan Thompson) and two faculty members (Fernando Diaz Morera and Lori Leonard) into Pi Mu Epsilon, a national Mathematical honor society. The induction ceremony took place on March 21 and Joseph Silerman from Brown presented *Public Key Cryptography for Fun(!) and Profit(?)*. The talk was presented to inductees, family, faculty and other students.

In addition, the Mathematics Department hosted the 44th annual Elizabeth Haskins Mathematics Contest for high school sophomores, juniors and seniors. We had about 160 students on campus for the contest, similar in numbers to last year and have ideas to increase that for next year.

In terms of next year, we will continue many of these successful programs listed above. We'd like to bring back the Math Department Tea time, a pre-COVID era monthly event that (although small) promoted community to our students and others across campus.