

ACADEMIC YEAR 2018 – 2019

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).

Cornelia Van Cott
(cvancott@usfca.edu)

Chair of the Department of Mathematics &
Statistics

2. Please indicate if you are submitting report for (a) a Major, (b) a Minor, (c) a Major and Minor

aggregated report (in which case, each should be explained in a separate paragraph as in this

template), (d) a Graduate or (e) a Certificate Program

Math Major and Math Minor aggregated
report.

3. Please note that a Curricular Map should accompany every assessment report. Have there been

any revisions to the Curricular Map?

There are no revisions to the Curricular Map for connecting PLOs to math courses. Until this

year, our department did not have a Curricular Map that connected PLOs to ILOs. I created

this recently, and it can be found in the additional materials of this document.

II. MISSION STATEMENT & PROGRAM LEARNING OUTCOMES

1. Were any changes made to the program mission statement since the last assessment cycle in

October 2018? Kindly state “Yes” or “No.” Please provide the current mission statement below.

There were no changes to the program mission statement.

- **Mission Statement (Major/Graduate/Certificate):**

The USF Department of Mathematics & Statistics seeks to deliver a quality

mathematics education to our majors and minors, inspiring them to appreciate,

understand, and engage with clear and rigorous thinking, both in abstract and concrete

setting

s.

- **Mission Statement (Minor):**

The USF Department of Mathematics & Statistics seeks to deliver a quality

mathematics education to our majors and minors, inspiring them to appreciate,

understand, and engage with clear and rigorous thinking, both in abstract and concrete

setting

s.

2. Were any changes made to the program learning outcomes (PLOs) since the last assessment cycle

in October 2018? 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. There were no changes to the program learning outcomes.

• PLOs (Major/Graduate/Certificate):

1. Differentiate and integrate functions of one and several variables; 2. Use differentiation and integration to solve problems in mathematics and other

disciplines;

3. Solve and understand linear systems;

4. Give direct proofs, proofs by contradiction, and proofs by induction; formulate definitions and construct counterexamples;

5. Read mathematics without supervision; write mathematics with correct style, including

typesetting;

6. Apply mathematics to problems in other disciplines; and

7. Use technology to solve mathematical problems.

• **PLOs (Minor):**

1. Differentiate and integrate functions of one and several variables;
2. Use differentiation and integration to solve problems in mathematics and other disciplines;
3. Solve and understand linear systems; 4. Give direct proofs, proofs by contradiction, and proofs by induction; formulate definitions and construct counterexamples; 5. Read mathematics without supervision; write mathematics with correct style, including typesetting; 6. Apply mathematics to problems in other disciplines; and
7. Use technology to solve mathematical problems.

3. State the particular program learning outcome(s) you assessed for the academic year 2018-2019.

What rubric did you use?

• **PLO(s) being assessed (Major/Graduate/Certificate):**

We assessed Program Learning Outcomes 1, 2, 3, 4, 5, and 6.

• **PLO(s) being assessed (Minor):**

We did not do any assessment of our minors this academic year.

III. METHODOLOGY

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

• **Methodology used (Major/Graduate/Certificate):**

To assess the aforementioned Program Learning Outcomes, our graduating math majors

took the **ETS Major Field Test for Mathematics** in April 2019. This exam is written by

the Educational Testing Service, the same organization that writes the GRE and TOEFL. In

the past two years (September 2017 through June 2019), this exam was taken by graduating math majors at a total of 185 institutions all across the United States. The total number of

examinees in this time period is 2,998.

The exam has 50 multiple choice questions and covers topics most commonly offered as part

of an undergraduate mathematics curriculum.

The content breakdown of the exam is as follows:

- **Calculus** (about 30%) Both single-variable and multivariable calculus.

- **Linear & Abstract Algebra** (about 30%)

Matrices, linear transformations, eigenvalues, eigenvectors, vector spaces, systems of

linear equations, elementary group/ring/field theory, elementary topics from number

theory

- **Additional Topics** (about

40%)

Complex analysis, differential equations, discrete mathematics (including graph theory and combinatorics), foundations (including logic, proofs, sets, functions and relations),

geometry, point-set topology, probability and statistics, and real analysis.

The exam questions are at three cognitive levels:

- **Routine** (about 55%) These questions cover definitions, questions with no more than a two-step reasoning

process, or questions that require a standard technique that is practiced extensively in

math courses at most institutions.

- **Non-routine** (about 25%)

Includes questions that require an idea that is considered insightful, questions that

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require several steps of reasoning, and questions that require either the use of several

definitions or a new definition that the student would not be expected to know.

Some questions may require bringing techniques from two or more areas to bear on one

problem

- **Applied** (about 20%)

This includes, for example, questions that are cast in real-world settings.

The relationship between this exam and our Program Learning Outcomes is as

follows:

- 30% percent of the exam problems cover calculus knowledge, which corresponds to
Program Learning Outcomes 1
and 2.
- 30% of the exam problems cover algebra knowledge, which corresponds to
Program
Learning Outcomes 3 and
4.
- 25% of the exam problems are classified as non-routine, requiring several
steps of
reasoning or a new definition that the student would not be expected to know,
which corresponds to Program Learning Outcomes 4 and 5.
- 20% of the exam problems are classified as applied, requiring the student to
apply
math to real-world settings. This corresponds to Program Learning
Outcome 6.

IV. RESULTS & MAJOR FINDINGS

Results (Major/Graduate/Certificate):

An outside observer might be shocked at our results this year. Our 2019 students' average

on this standardized exam jumped up *15 points* from our majors in 2018 (Table 2).

Moreover,

our institutional average was 15 points above the national average. If we break down our students' performance by question type (Table 3), our students again performed well above the

national means in every category.

We professors cannot take the credit for this burst of apparent brilliance from our students.

We had three very strong students graduate last year (out of six total). The three students are

currently in graduate school at strong mathematics programs (Brown University, University

of Nebraska-Lincoln, and UC San Diego). One of these students earned a perfect score (200) on the exam, the other two scored 189 and 183, respectively. These scores raised our average

dramatically, and our standard deviation (20) is not significantly different from previous years for USF students (Table 2). Individual scores for all 6 students are in Table 1, listed in

descending order.

Table 1. USF Math major scores on the 2019 ETS Major Field Test for Mathematics. (Scores are listed in descending order. The scale range for the total score is 120 – 200.)

STUDENT TOTAL SCORE

1 200 2 189 3 183 4
168 5 156 6 141

Table 2. A summary of total scores on the 2019 ETS Major Field Test in Mathematics. (The scale range for the total score is 120 – 200.)

		Mean score	Standard Deviation	n
Nationwide individual mean score (2017-19)	2,998 examinees	157.4	17.7	
Nationwide institution mean score (2017-19)	185 institutions	156.2	8.5	
USF 2019	6	172.8	20	
USF 2018	13	157	22	
USF 2017	11	159	22	
USF 2016	12	161	20	

Table 3. A breakdown of performance on the 2019 ETS Major Field Test in Mathematics by question type. (Numbers in table represent the mean percent correct for each question type.)

Algebra	Questions	Calculus	Questions	Routine
				Routine
Applications	Applied Applications	Questions	Routine	Routine
			Questions	Routine
	Questions		Non-routine	
	Questions		Non-routine	

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Nationwide institution mean (2017-19) 31.4 34.1 35.7 33.8 26.8

USF 2019 48 48 55 52 28

USF 2018 27 35 33 29 38

USF 2017 30 35 38 32 30

USF 2016 30 45 33 38 29

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V. CLOSING THE LOOP: ACTION PLAN BASED ON ASSESSMENT RESULTS

1. Based on your analysis in Section 4, what are the next steps that you are planning in order to achieve

the desired level of mastery in the assessed learning outcome?

**Closing the Loop
(Major/Graduate/Certificate):**

We plan to administer the exam again to our graduating math majors in May 2020.

2. What were the most important suggestions/feedback from the FDCD on your last assessment report (for academic year 2017-2018, submitted in October 2018)? How did you

incorporate or address the

suggestion(s) in the more recent assessment discussed in this report?

- **Suggestions (Major/Graduate/Certificate):**

After our last assessment report, our FDCD Jack Lendvay pointed out that our program needed a curriculum map that connected ILOs to PLOs. In response, I made this

curriculum map. It is in the section Additional Materials.

VI. BIG PICTURE

What have you learned about your program from successive rounds of assessment? Is a picture of the whole program starting to emerge? For example, what areas of strength have emerged? What opportunities of improvement have you identified?

- **Big Picture (Major/Graduate/Certificate):**

I believe the sample size is too small to make any conclusions yet.

VII. Feedback to your Assessment Team

What suggestions do you have for your assessment team (the Faculty Directors of Curriculum Development and the Associate Dean for Academic Effectiveness)? What can we do to improve the process?

Thank you for asking. There are many things that need to be improved in my department in order to better instruct students and to improve student learning, but I fear that an assessment exercise, no matter how carefully followed, would not uncover these (or any) true problems. To be honest, however, I don't expect assessment data to do that kind of work for me. I can and must do the time-intensive work myself of listening to others, asking questions, being present, and observing the challenges we are facing. I am working day-in and day-out to address these challenges and help my department improve. I wish that this kind of consistent, concrete effort that I and others make would be emphasized and recognized by USF, rather than giving so much air-time and public appreciation to those who have nice assessment reports.

ADDITIONAL MATERIALS

Below we have
included:

- list of sample questions for the mathematics exam, given by ETS.
- curriculum maps.

