Academic Assessment Committee
CCSU
Central Connecticut State University

Submission Guidelines for INTERIM Assessment Reports (assessment results from AY 2017-2018)

Guidelines:

1) *Submission deadline:* ***October 15, 2018,*** *early submissions are encouraged.*
2) *Submit electronically to Yvonne Kirby (Director of OIRA) as an email attachment (ykirby@ccsu.edu)*
3) *Provide a SEPARATE REPORT for each academic program. All certificate and degree programs are required to be assessed per NEASC. Check the reporting calendar to see which certificate programs are considered embedded in a degree program as these programs do not need to be reported on separately.*
4) *An Interim report consists of the completed Overview report for the academic program.*
5) *The Interim report includes a General Education Overview where your department's contribution to the assessment of CCSU's General Education Learning Objectives/Outcomes is reported.*

Reminder: Assessment reporting is on a five-year cycle, consisting of a full report in year one followed by interim reports for three years and then a summary report is due in the fifth year. The assessment cycle is aligned with the Program Review Cycle such that the full assessment report is due the year prior to the year that the department will submit their program review report. In lieu of a Full Assessment report during their Program Review year, departments should submit a 1-page summary report. This ensures that we are in compliance with NEASC and BOR requirements. Departments that are accredited by an outside agency, and thus exempt from the Program Review Policy, should follow the guidelines for assessment reporting as described in this document and follow the Assessment Calendar. Where possible, the assessment cycle will be aligned with the accreditation cycle and a Summary report will be due in the year the self-study is due to the accrediting body.

Interim reports: Complete ONLY the Overview for the program, complete with contribution to the assessment of CCSU's General Education Learning Objectives/Outcomes. URL to Assessment website resources: http://www.ccsu.edu/oira/assessment/AAP.html

Overview: **The following questions are required by the Connecticut State Colleges and University Board of Regents, NEASC and the CCSU Academic Assessment Committee (AAC). These questions must be completed annually for all academic programs as well as all departments offering courses in general education. Submit a separate table for each program and for each general education learning outcome the department teaches.**

- You are encouraged to address the questions using bullet statements rather than paragraph form —full details should be included within the text of the full report when it is due, not in the Overview.
- **Interim reports**: The Overview should append clearly labeled data tables as appropriate - for both the academic program as well as general education.

Overview

Department: Mathematical Sciences

Report Preparer: Frederic Latour

Program Name and Level: BA in Mathematics (Undergraduate)

Program Assessment Question	Response
URL: Provide the URL where the learning outcomes (LO) can be viewed.	http://www.ccsu.edu/mathematics/files/BA_ProgramLearningOutcomes.pdf
LO Changes: Identify any changes to the LO and briefly describe why they were changed (e.g., make LO more discrete, align LO with findings). If no changes were made, please report not applicable.	N/A
Strengths: What about your assessment process is working well?	The Mathematical Sciences department has begun to make changes to its courses, partly based on findings from previous assessment reports.
Improvements: List ways in which your assessment process needs to be improved based on student data. (A brief summary of changes to assessment plan can be reported here)	The Mathematical Sciences department used to have an Assessment Coordinator, but when she left that position, she was not replaced. As a result, no new data were collected since then, except for the data that the report preparer has access to from his own classes. Fortunately, our new department chair (who has only been in office since August 27, 2018) has made a commitment to improve our assessment process. One possibility would be to create a standing committee of the department in charge of assessment, under the guidance of the Chair or Assistant Chair.
For Each Learning Outcome (LO) complete questions 1, 2 and 3: Many programs have a large number of LOs, please limit the report to no more than five.	

LO 1. Understand basic analytic arguments using such common notions as epsilon/delta, infinite sums, and limits.	
1.1) **Assessment Instruments**: What is the source of the data/evidence, other than GPA, that is used to assess the stated outcomes? (e.g., capstone course, portfolio review and scoring rubric, licensure examination, etc.)	Faculty use a rubric to assess levels of performance for each student taking Calculus I - Math 152 and Calculus II - Math 221. Professors complete a Course Learning Outcome rubric for each student and they use these results to determine the level of performance for the associated Program Learning Outcome. The current performance levels are: (2) Strong Performance of the Learning Outcome; (1) – Acceptable Performance of the Learning Outcome; (0) – Does Not Meet the Learning Outcome. The Course Learning Outcomes for Math 152 are: · Compute and understand limits · Compute and understand derivatives · Solve application problems using derivatives The Course Learning Outcomes for Math 221 are: · Compute definite and indefinite integrals using varied techniques · Determine convergence of sequences and series · Apply integration to compute areas and volumes of revolution
1.2) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.).	In the past, the Mathematics Department ad hoc faculty Assessment Committee made up of professors who teach the courses and the Department Chair and/or one of the Department's Assistant Chairs. This time, it was done by the report preparer.
1.3) **Results**: Since the most recent full report, list: a. The conclusion(s) drawn b. The changes that were or will be made as a result of those conclusion(s)	Conclusion: We have reported by faculty N=382 students taking Calculus I and Calculus II. This includes a mix of BA and other students. The number of students Not Meeting Expectations is 115 (30%), while the number Meeting Expectations is 167 (44%), and the number Exceeding Expectations is 100 (26%). In the past, the department conjectured that the large number of students not meeting expectations should attributed to the fact that most students that take Math 152 are not BA majors, and these students are included in the data. It would be worthwhile to collect data to compare the performance of BA majors versus other majors. Changes: In our 2015-16 report, it was stated that the department would revisit the distribution of topics between MATH 152 and MATH 221 to improve the rate of success in MATH 221. The department has created an ad hoc committee, consisting of Professors Chen, Castaneda, Gotchev, and Makover, to revise the distribution of topics in MATH 152, 221, and 222 (the latter being Calculus III, a course that many faculty members feel contains too many topics that cannot be covered in the allotted time). We will report on the results of this possible revision next year. It would be helpful, in the future, to expand data collection to include MATH 222, and to also collect data about student performance in Calculus I relative to their performance in Precalculus, or their performance in Calculus II relative to their performance in Calculus I, since past reports expressed concerns about prerequisite requirements.

LO 2. Understand basic algebraic and discrete notions, such as facts about vector spaces and counting arguments.	
2.1) **Assessment Instruments**: What is the source of the data/evidence, other than GPA, that is used to assess the stated outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)	Faculty use a rubric to assess levels of performance for each student taking Discrete Mathematics - Math 218 and Linear Algebra - Math 228. The Course Learning Outcomes for Math 218 are: Prove mathematical statements, Understand sets and functions (including properties and applications), Prove suitable mathematical statements by induction, Solve basic combinatorial problems. The Course Learning Outcomes for Math 228 are: Solve systems of linear equations, Perform computations involving matrices, Apply and verify linearity of transformations, and Understand and apply vector space definitions and properties. Professors use the Course Learning Outcomes as a rubric to determine their decision for how they rate students on the Degree Program Learning Outcome (LO2). Having Course Learning Outcomes make it more likely that professors will be on the same page when assessing the Degree Program Learning Outcome. They will all consider the same skills in making their decisions.
2.2) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.).	In the past, the Mathematics Department ad hoc faculty Assessment Committee made up of professors who teach the courses and the Department Chair and/or one of the Department's Assistant Chairs. This time, it was done by the report preparer.
2.3) Since the most recent full report, list: a. The conclusion(s) drawn b. The changes that were or will be made as a result of those conclusion(s)	Conclusion: We have reported by faculty N=222 students in the program taking Math 218 and Math 228. The number of students Not Meeting Expectations is 22 (10%), while the number Meeting Expectations is 77 (35%), and the number Exceeding Expectations is 123 (55%). In the higher level courses, Math 218 and 228, the students consistently performed better on LO2 than on LO1. Fewer students were at the level of Not Meeting Expectations.
	Changes: Both MATH 218 and 228 underwent significant changes in the recent past. In the case of MATH 218, this was because of a Computer Science department request to create a Discrete Mathematics course specifically for their students (MATH 217). As a result, MATH 218 is now specifically intended for Mathematics majors, instead of being for both Math and CS. As a result, the department should revise its course learning outcomes in order to serve a different student clientele. In MATH 228, as a result of past assessment reports which showed that students had no difficulty with the more computational course learning outcomes, the department changed the recommended textbook to a new, free online book that emphasizes the theoretical aspects of the material (which the students find more challenging, but will also prepare students better for future courses). The department should revise the course learning objectives to reflect these changes.

LO 3: Be able to follow and recreate algebraic proofs, with a good understanding of groups.	
3.1) **Assessment Instruments**: For each LO, what is the source of the data/evidence, other than GPA, that is used to assess the stated outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)	Faculty use a rubric to assess levels of performance for each student taking Math 366. The Course Learning Outcomes for Math 366 are students will: Understand and apply definitions of group, subgroup, Understand and apply definitions and properties of cyclic group, permutation group, factor group, and Understand and apply definitions and properties of homomorphism, isomorphism. Professors use the Course Learning Outcomes as a rubric to determine their decision for how they rate students on the Degree Program Learning Outcome. Having Course Learning Outcomes make it more likely that professors will be on the same page when assessing the Degree Program Learning Outcome. They will all consider the same skills in making their decisions.
3.2) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.).	In the past, the Mathematics Department ad hoc faculty Assessment Committee made up of professors who teach the courses and the Department Chair and/or one of the Department's Assistant Chairs. This time, it was done by the report preparer.
3.3) Since the most recent full report, list: a. The conclusion(s) drawn b. The changes that were or will be made as a result of those conclusion(s)	Conclusion: We have reported by faculty on N=140 students taking Math 366. The number of students Not Meeting Expectations is 19 (14%). Overall 57 (41%) students Exceeded Expectations and 64 (46%) Met Expectations. The number of students in the BA program is relatively small, making data analysis less relevant in terms of percentages. The number of students Not Meeting Expectations is rather low given the level of difficulty of this course, and suggests that students are receiving adequate preparation in the prerequisite course (MATH 218).
	Changes: N/A

LO 4. Be able to both follow and recreate analytic proofs, including basic ideas involving abstract metric spaces and differential equations.	
4.1) **Assessment Instruments**: For each LO, what is the source of the data/evidence, other than GPA, that is used to assess the stated outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)	Faculty use a rubric to assess levels of performance for each student taking Math 377. The Course Learning Outcomes for Math 377 are students will: Understand the topology of the real line, Rigorously determine/prove convergence of sequences, Rigorously determine/prove continuity and uniform continuity of functions, and Understand distinct types of convergence of sequences of functions. Professors use the Course Learning Outcomes as a rubric to determine their decision for how they rate students on the Degree Program Learning Outcome. Having Course Learning Outcomes make it more likely that professors will be on the same page when assessing the Degree Program Learning Outcome. They will all consider the same skills in making their decisions.
4.2) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.).	In the past, the Mathematics Department ad hoc faculty Assessment Committee made up of professors who teach the courses and the Department Chair and/or one of the Department's Assistant Chairs. This time, it was done by the report preparer.
4.3) Since the most recent full report, list: a. The conclusion(s) drawn b. The changes that were or will be made as a result of those conclusion(s)	Conclusion: We have data reported by faculty for N=82 students taking Math 377. The number of students not meeting the expectations is 11 (14%). Overall 30 students (37%) Exceeded Expectations, and 41 (50%) Met Expectations. The number of students in the BA program is relatively small, making data analysis less relevant in terms of percentages. The number of students Not Meeting Expectations is rather low given the level of difficulty of this course, and suggests that students are receiving adequate preparation in the prerequisite course (MATH 218).
	Changes: The department should consider revising the course learning objectives; in particular, there is no course learning objective relating to Riemann integration, and the fourth course learning objective concerns an optional topic.

LO 5. Be able to independently investigate more advanced topics in mathematics and present their results to others in a clear way.	
5.1) **Assessment Instruments**: For each LO, what is the source of the data/evidence, other than GPA, that is used to assess the stated outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)	Faculty use a rubric to assess levels of performance for each student taking Math 450, a capstone course. LO5 is assessed at the end of a student's program in the course MATH 450 Seminar in Proof which is only offered in the Spring semester. To assess LO5: Be able to independently investigate more advanced topics in mathematics and present their results to others in a clear way, professors use two rubrics. One rubric is for a culminating written assignment and the other for a culminating oral presentation. Please see attached rubrics.
5.2) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.).	In the past, the Mathematics Department ad hoc faculty Assessment Committee made up of professors who teach the courses and the Department Chair and/or one of the Department's Assistant Chairs. This time, it was done by the report preparer.
5.3) Since the most recent full report, list: a. The conclusion(s) drawn b. The changes that were or will be made as a result of those conclusion(s)	Conclusion: This course is normally taken at the end of a student's BA program. Students taking this course are well prepared, as reflected by the results. Overall, the course objectives with the lowest results are the ones having to do with the motivation; some students who can explain the proof well have a harder time explaining why it is important. This is not surprising, because explaining the motivation requires doing some independent research about the topic, and students have had less experience with doing that than they have with writing correct and complete proofs. Note: The rubric used for this LO was piloted once in spring 2014. The spring 2015 professor did not grade for motivation because s/he did not ask students for their broader motivation for the proofs. We have reported data by faculty for N=55 students in the program taking MATH 450. The number of students not meeting the expectations is 2 (4%). Overall 25 (45%) students Exceeded Expectations, and 28 (51%) Met expectations, and 2/42 (5%) Did Not Meet Expectations. The number of students in the BA program is relatively small, making data analysis less relevant in terms of percentages.
	Changes: The rubric should be reviewed to determine if it is appropriate for all instructors teaching the course.

Interim reports: Append clearly labeled supporting data tables, organized by LO

General Education Summary:

1. All departments contribute to the general education foundation of CCSU students (i.e., the CCSU General Education Learning Objectives/Outcomes) and must submit the General Education Summary below.
2. If your department participated in the General Education Assessment initiative (Multi-State model), complete only Summary questions 1) and 2) below.
3. If your department assesses GenEd Learning Objectives/Outcomes at the department-level, complete Summary questions 1) – 7). Complete one Summary table for each LO assessed.

URL for the list of approved general education courses and LO/objectives:
http://ccsu.smartcatalogiq.com/en/current/Undergraduate-Graduate-Catalog/Undergraduate-General-Education-Program

Department: Mathematical Sciences

General Education LO Assessed: #6 - To strengthen quantitative skills. Relevant outcomes include the ability to: apply mathematical and statistical techniques as a means of analysis within a variety of disciplines, and assess the strengths and weaknesses of these techniques of analysis. We also have one course that contributes to LO #2.

Report Preparer: Dr. Frederic Latour

General Education Questions	Response
1) Courses: List course(s) and the CCSU General Education Learning Objective/Outcome with which the course is aligned. (These include courses across all schools and departments and are not limited only to designated GenEd Study and Skill Area courses.)	MATH 102, 103, 105, 106, 110, 113, 115, 116, 119, 123, 124, 125, 135, 136, 152, 213, 217, 218, 221, 344, and STAT 104, 200, 201, 215, 216 are used in the General Education program. MATH 344 aligns with objective 2; all other courses, with objective 6.
Participation in General Education Assessment Initiative (Multi-State Collaborative model)	**Response**
2) Our departmental faculty participated in the assessment of the GenEd Learning Objectives/Outcomes by contributing to the GenEd Assessment Initiative (Multi-State Collaborative model). *Please list the*	General Education Learning Objective #6 --- To strengthen quantitative skills. Relevant outcomes include the ability to: apply mathematical and statistical techniques as a means of analysis within a variety of disciplines, and assess the strengths and weaknesses of these techniques of analysis. Marian Anton

participating faculty and General Education Learning Objective/Outcome(s) for which faculty have provided student artifacts.	
Participation through Department-level GenEd Assessment	**Response**
3) **Assessment Instruments**: What data/evidence, other than GPA, are used to assess the stated CCSU General Education Objective/Outcome? (e.g., capstone course, portfolio review, licensure examination, etc.)	Faculty that teach General Education courses are sent a list of their students and asked to assess their students on the General Education Learning Outcome: Students will apply mathematical and statistical techniques as a means of analysis within a variety of disciplines, and assess the strengths and weaknesses of these techniques of analysis. Professors are asked to assess students using performance levels of Exceeds (2), Meets (1) and Does Not Meet (0). There is no rubric at this time.
4) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. Assistant, etc.).	Our department has not looked closely at General Education
5) **Results**: Since the most recent full report, list: a. The conclusion(s) drawn, noting strengths and weaknesses. b. The changes that were or will be made as a result of those conclusion(s).	N/A
6) **Strengths in your Assessment Process**: List ways in which your assessment process is working well.	Our department has not looked closely at General Education
7) **Improvements**: List ways in which your GenEd assessment process needs to improve based on student data (A brief summary of changes to assessment plan can be reported here).	Our department will participate in the Multi-State Collaborative. This will give the department incentive to take a closer look at general education. In the past, we have also considered using the AAC&U Rubric for Quantitative Literacy to assess the Learning Outcomes in selected General Education courses, but no decision has been made on this matter.

Interim reports: Append clearly labeled supporting data tables, organized by LO.

APPENDIX A
Findings for Degree Program Learning Outcomes

Table 1. Findings for Degree Program Learning Outcomes

	Number and Percent of Students at each Level (2, 1, 0)														
	Fall 2011/Spring 2012			Fall 2012/Spring 2013			Fall 2013/Spring2014			Fall 2014/Spring 2015			Fall 2015 through Summer 2018		
Program Learning Outcomes	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**
1. Understand basic analytic arguments using such common notions as epsilon/delta, infinite sums, and limits															
Math 152	3 (75%)	1 (25%)	0 (0%)	14 (30%)	22 (48%)	10 (22%)	19 (46%)	12 (29%)	10 (25%)	31 (43%)	26 (35%)	17 (23%)	5 (19%)	10 (37%)	12 (44%)
Math 221	1 (10%)	5 (50%)	4 (40%)	10 (21%)	35 (75%)	2 (4%)	2 (5%)	23 (52%)	19 (43%)	6 (15%)	17 (41%)	18 (44%)	9 (19%)	16 (33%)	23 (48%)
2. Understand basic algebraic and discrete notions, such as facts about vector spaces and counting arguments.															
Math 218	1 (8%)	8 (61.5%)	4 (31.5%)	4 (36%)	7 (64%)	0 (0%)	9 (33%)	13 (48%)	5 (19%)	19 (40%)	20 (43%)	8 (17%)	NR	NR	NR
Math 228	12 (40%)	18 (60%)	0 (0%)	7 (41%)	10 (59%)	0 (0%)	15 (37.5%)	22 (55%)	3 (7.5%)	5 (25%)	15 (75%)	0 (0%)	10 (59%)	5 (29%)	2 (12%)
3. Be able to follow and recreate algebraic proofs, with a good understanding of groups.															
Math 366	12 (28%)	25 (58%)	6 (14%)	NR	NR	NR	8 (31%)	14 (54%)	4 (15%)	12 (57%)	9 (43%)	0 (0%)	25 (50%)	16 (32%)	9 (18%)
4. Be able to both follow and recreate analytic proofs, including basic ideas involving abstract metric spaces and differential equations.															
Math 377	1 (6%)	11 (69%)	4 (25%)	NR	NR	NR	6 (27%)	12 (55%)	4 (18%)	9 (50%)	9 (50%)	0 (0%)	10 (59%)	5 (29%)	2 (12%)
5. Be able to independently investigate more advanced topics in mathematics and present their results to others in a clear way.															
Math 450							9 (53%)	8 (47%)	0 (0%)	10 (40%)	13 (52%)	2 (8%)	6 (46%)	7 (54%)	0 (0%)

APPENDIX B

Findings for Course Learning Outcomes

Table 2. Mathematics 152

		Number of Students at each Level (2, 1, 0)																		
		Spring 2011 (n = 2)			Fall 2011/Spring 2012 (n= 4)			Fall 2012/Spring 2013 (n = 46)			Fall 2013/ Spring 2014 (n=41)			Fall 2014/Spring 2015 (n = 74)			Spring 2016 (n = 27)			
Course Learning Outcomes		**2**	**1**	**0**	**2**	**1**	**2**	**1**	**0**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	
I.	Compute and understand limits	n/a	n/a	n/a	n/a	n/a	32	31	11	n/a	19	15	7	32	31	11	10	12	5	
II.	Compute and understand derivatives	1	1	0	3	1	28	22	24	4	18	15	8	28	22	24	8	7	12	
III.	Solve application problems using derivatives	1	1	0	2	1	12	25	37	10	4	17	20	12	25	37	8	9	10	

Note: Spring 2011, some sections of Math 152 had no BA majors. AY 2011-12 is combined BA and BSED students. From AY 2012-13 and on includes all majors.
n/a denotes invalid data (the learning outcome was stated incorrectly in year one; therefore, the data was not useful).

Table 3. Mathematics 218

	Number of Students at each Level (2, 1, 0)														
	Spring 2011 (n=7)			Fall 2011/Spring 2012 (n=14)			Fall 2012/Spring 2013 (n=11)			Fall 2013/Spring 2014 (n=27)			Fall2014/Spr15 (n=49)		
Course Learning Outcomes	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**
I. Prove mathematical statements	3	3	1	5	6	3	3	8	0	10	12	5	17	19	13
II. Understand sets and functions (including properties and applications)	3	0	4	8	4	2	10	1	0	13	10	4	19	20	10
III. Prove suitable mathematical statements by induction	3	1	3	5	1	8	2	7	2	11	12	4	13	23	13
IV. Solve basic combinatorial problems	2	5	0	1*	4*	0*	4	7	0	7	14	6	18	22	9

Note: Spring 2011 (BA students only), one student did not attend class after the first test and is not included in the table above or in the "*n*". Fall 2011 is combined BA and BSED students. Fall 2011, two students are not included in table. *One section of Math 218 (n=9) did not cover course learning outcome IV. NR – not reported by faculty. Spring 2013 one student was not involved in class and is not reported in the "*n*" or in the table.

Table 4. Mathematics 221

		Number of Students at each Level (2, 1, 0)														
		Fall 2011/Spring 2012 (n=11)			Fall 2012/Spring 2013 (n=48)			Fall 2013/Spring 2014 (n=44)			Fall 2014/Spring 2015 (n=41)			Fall 2015/Spring 2016 (n=48)		
Course Learning Outcomes		**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**
I.	Compute definite and indefinite integrals using varied techniques	2	5	3	42	5	0	5	25	14	19	11	11	11	18	19
II.	Determine convergence of sequences and series	2	6	3	29	18	1	3	19	22	9	15	17	13	13	22
III.	Apply integration to compute areas and volumes of revolution	3	7	1	20	26	2	11	18	15	24	8	9	19	11	18

Note: Three students did not finish the semester in Fall 2011 (BA only), not included in the "*n*". Fall 2011 is combined BA and BSED students.

Table 5. Mathematics 228

		Number of Students at each Level (2, 1, 0)																	
		Spring 2011 (n = 14)			Fall 2011/Spring 2012 (n=30)			Fall 2012/Spring 2013 (n=17)			Fall2013/Spring2014 (n=40)			F14/Spr15 (n=20)			Summer 2017/2018 (n=17)		
Course Learning Outcomes		**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**
I.	Solve systems of linear equations	12	2	0	30	0	0	17	0	0	37	2	1	20	0	0	12	5	0
II.	Perform computations involving matrices	14	2	0	30	0	0	17	0	0	35	4	1	19	1	0	12	5	0
III.	Apply and verify linearity of transformations	4	4	6	21	9	0	14	3	0	20	19	1	12	8	0	8	8	1
IV.	Understand and apply vector space definitions and properties	5	7	2	12	17	1	8	9	0	15	22	3	10	10	0	9	6	2

Fall 2011 is combined BA and BSED students only. NR – not reported by faculty

Table 6. Mathematics 366

		Number of Students at each Level (2, 1, 0)																
		Spring 2011 (n=9)			Fall 2011/Spring 2012 (n=43)			Fall 2013/Spring2014 (n=26)			Fall 2014/Spring2015 (n=21)			Fall 2015 (n=13)			Spring 2017/18 (n=38)		
Course Learning Outcomes		**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**
I.	Understand and apply definitions of group, subgroup	4	3	2	25	13	5	14	9	3	14	7	0	6	5	1	21	10	7
II.	Understand and apply definitions and properties of cyclic group, permutation group, factor group	2	4	3	18	20	5	9	13	4	10	10	1	6	4	2	18	15	5
III.	Understand and apply definitions and properties of homomorphism, isomorphism	2	4	3	14	24	5	15	8	3	6	10	5	5	4	3	16	14	8

Table 7. Mathematics 377

	Number of Students at each Level (2, 1, 0)														
	Spring 2011 (n=9)			Fall 2011/Spring 2012 (n=16)			Fall 2013/Spring 2014 (n=22)			Fall 2014/Spring2015 (n=18)			Fall2016 (n=18)		
Course Learning Outcomes	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**
I. Understand the topology of the real line	5	1	0	11	4	1	7	14	1	7	9	2	6	8	3
II. Rigorously determine/prove convergence of sequences	4	2	0	7	7	2	9	8	5	12	6	0	11	5	1
III. Rigorously determine/prove continuity and uniform continuity of functions	2	3	1	3	10	3	6	14	2	8	7	3	15	1	1
IV. Understand distinct types of convergence of sequences of functions	0	5	1	1	11	3	NR	NR	NR	6	9	3	NR	NR	NR

Note: Spring 2011 three students were not scored because they stopped showing up for class after the first week. NR – not reported by faculty.

Table 8. Mathematics 450

Course Learning Outcomes	Number of Students at each Level (2, 1, 0)									
	Spring 2014 (n=17)			Spring 2015 (n=25)			Spring 2018 (n=13)			
	2	**1**	**0**	**2**	**1**	**0**	**2**	**1**	**0**	
1.2 Completeness /Thoroughness	10	5	2	11	12	2	6	5	2	
1.2 Correctness	8	9	0	12	10	3	6	6	1	
1.3 Motivation	7	9	1	n/a	n/a	n/a	7	4	2	
2.2 Completeness /Thoroughness	11	6	0	15	9	1	9	3	1	
2.2 Correctness	10	7	0	17	7	1	9	4	0	
2.3 Motivation	8	9	0	n/a	n/a	n/a	12	1	0	

Note: The spring 2015 professor did not grade for motivation because s/he did not ask students for their broader motivation for their proofs.

Table 9. Mathematics 450 Assessment Rubric for Written Assignment

(1) The student will be able to present a mathematical topic or proof in writing.	2 - Strong performance	1 - Acceptable performance	0 - Unacceptable performance
1.1 Completeness /Thoroughness	The student's written presentation is thorough. It includes a large amount of relevant information about the topic or proof, and reflects a deep understanding.	The student's written presentation covers some useful information about the topic or proof, but is missing some important parts.	The student's written presentation is superficial. It is missing a large amount of relevant information and provides only limited information about the topic or proof.
1.2 Correctness	The student's written presentation contains no, or few, mathematical mistakes.	The student's written presentation contains a significant number of mathematical mistakes.	The student's written presentation contains pervasive mathematical mistakes that would impede a reader's understanding of the subject.
1.3 Motivation	The student's written presentation makes clear why the topic or proof is important.	The student's written presentation contains limited information about why the topic or proof is important.	The student's written presentation does not contain information about why the topic or proof is important, or the information is incorrect.

Table 10. Mathematics 450 Assessment Rubric for Oral Assignment

(2) The student will be able to present a mathematical topic or proof orally to his or her peers.	2 - Strong performance	1 - Acceptable performance	0 - Unacceptable performance
2.1 Completeness /Thoroughness	The student's oral presentation is thorough. It includes a large amount of relevant information about the topic or proof, and reflects a deep understanding.	The student's oral presentation covers some useful information about the topic or proof, but is missing some important parts.	The student's oral presentation is superficial. It is missing a large amount of relevant information and provides only limited information about the topic or proof.
2.2 Correctness	The student's oral presentation contains no, or few, mathematical mistakes.	The student's oral presentation contains a significant number of mathematical mistakes.	The student's oral presentation contains pervasive mathematical mistakes that would impede a reader's understanding of the subject.
2.3 Motivation	The student's oral presentation makes clear why the topic or proof is important.	The student's oral presentation contains limited information about why the topic or proof is important.	The student's oral presentation does not contain information about why the topic or proof is important, or the information is incorrect.