Applied Mathematics
2020-21 Program Assessment Report

Program Location: Klamath Falls Campus Only

Program Headcounts*:

Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020			
32	28	35	31	36			

* The headcount is often difficult to measure since many students are dual majors and sometimes not counted.

Program Graduates:

2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
7	4	4	5	7	8	4	7	11

Employment Rates and Salaries:

Years	Employed	Continuing Education	Median Salary	Success Rate
2015/2016/2017	70%	30%	$47,000	100%
2016/2017/2018	33%	44%	$47,000	78%
2017/2018/2019	57%	19%	NA	81%
2018/2019/2020	50%	17%	NA	72%

Dates for when course objectives have been last revisited:

The department has created course objectives, student learning outcomes and supporting criteria for each course that isoffered thru the department. The following dates list the last time the course objectives file was reviewed/modified. The courses in red will be reviewed this year.

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Upon graduation, students will be able to

1. apply mathematical concepts and principles to perform computations
2. apply mathematics to solve problems
3. create, use and analyze graphical representations of mathematical relationships
4. communicate mathematical knowledg [(:)] Ttut0g 0. g v7.5 0 g>> BDC q 0.00000912 0 612 7923u 61F

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Freshman Year

Fall
MATH 251 - Differential Calculus (4)
SPE 111 - Public Speaking (3)
WRI 121 - English Composition (3)
Social Science Elective (3)
Elective Credit Hours (3)
Total: 16 Credit Hours
Winter
ENGR 266 - Engineering Computation (3)
MATH 252 - Integral Calculus (4)
PHY 221 - General Physics with (4)
WRI 122 - Argumentative Writing (3)
Social Science Elective (3)
Total: 17/18 Credit Hours
Spring
MATH 253N - Sequences and Series (4)
PHY 222 - General Physics with Calculus (4)
Humanities Elective (3)
Social Science Elective (3)
Total: 14 Credit Hours

Sophomore Year

Fall
MATH 254N - Vector Calculus I (4)
MATH 310 Mathematical Structures (4)
PHY 223 - General Physics with Calculus (4)
Elective (3)
Total: 15 Credit Hours
Winter
MATH 341 - Linear Algebra I (4)
MATH 354 - Vector Calculus II (4)
Elective (4)
Humanities Elective (3)
Total: 15 Credit Hours
Spring
MATH 361 - Statistical Methods I (4)
Elective (3)
Elective (3)
Elective (3)
Humanities Elective (3)
Total: 16 Credit Hours

Junior Year

Fall
MATH 321 - Applied Differential Equations (4)
SPE 321 - Small Group and Team Communication (3)
Focused Elective (3)
Elective (4) (upper division)
Total: 14 Credit Hours
Winter
MATH 311 - Introduction to Real Analysis (4)
WRI 227 - Technical Report Writing (3)
Focused Elective (3)
Elective (3) (upper division)
Elective (3)
Total: 16 Credit Hours
Spring
MATH 322 - Applied Differential Equations II (4)
MATH 451 - Numerical Methods I (4)

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Assessment of three learning outcomes was conducted during this academic year (Outcomes 3, 6, 7). A combined rate of proficiency and high proficiency of at least 60% is considered a minimum acceptable performance. We used three direct measures for each outcome and one indirect measure. We had planned to also include an additional indirect measure for each by using the student exit survey; however, since the response rate was only 1 student, we decided to omit this data as it was deemed statistically insignificant.

Outcome 3: *Create, use and analyze graphical representations of mathematical relationships* was assessed in Math 422, in the Winter of 2021. The instructor was Dr. Tiernan Fogarty. There are two performance criteria for this PSLO.

a)

Interpret Graphical Data With Respect to Error Analysis(1.000, 50%)OIT-BMTH.3	Explain in words and with a graph, error analysis by comparing graphical and theoretical results	Correct written interpretation of the graph. No graph provided that further explains error analysis	Incorrect explanation of graphical results. Explanation does not include graphical interpretation.

Indirect Measure

The table below lists the final exam score (out of 100) and the course grades of the 12 student who took the course (in descending order of scores and their respective grades). Note that 2 of these students did not take the final exam.

Final Exam Score	88	83	74	66	61	54	53	52	50	16	0	0
Course Grade	B	A	B	C	C	C	B	C	C	F	F	F

Proof of Cauchy Sequence	0	3	7

Table 2: Assessment results of direct measures of Outcome 6

Conclusion

MATH 311 is traditionally a challenging course for the majority of math majors. While the question that involved presenting a formal proof of the limit of a function did not have the best outcomes, the overall studer performance in the course was quite good. 9 out of the 10 students who completed the course (i.e. took t exam) earned a C or better. In addition, the question testing the proof of a Cauchy sequence had very good outcomes where all the 10 students were proficient or above, including 7 students who were highly proficient.

Outcome 7: *Independent learning* was assessed in Math 354 Vector Calculus II, during Winter 2021. The instructor was Dr. David Hammond. There are three performance criteria for this PSLO.

a) Determine or recognize an application of vector calculus.
b) Read and analyze an application not studied in the class.

Table3
proficiency, proficient, or highly proficient on each of the three assessment questions

	Student Performance		
Criterion	%-Some/no proficiency	%-Proficient	%-High Proficiency
Recognize an application	11	11	78
Analyze an application	11	11	78
Oral presentation	22	11	67

Table4. Assessment results for Outcome 7.

For the first of the criteria, to recognize an application of one of the integral theorems, 78 % of the class

theorem or the divergence theorem in their abstract and/or final presentation. One student did not mentio theorems at all in their presentation, and did not show any proficiency in this objective, whereas 1 other stude showed some proficiency but not high proficiency.

Very similar results were observed for the second criteria, as assessed by the correctness of the mathematical content presented, the mathematical notation used, and the relevance of the mathematical results presented the chosen application.

For the third criteria, 67% of the students demonstrated high proficiency through the quality of their spoken presentations, the design and layout of their slides, and through the organization of their presentation. 2 stude showed little or no proficiency for the third criteria, and one showed some proficiency but not high proficiency

Based on this assessment exercise, our students met or exceeded our stated 60% performance minimum for Outcome 7.

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We continue to feel strongly that the decision was correct to create a course Math 310 Mathematical Structures and require this course as a prerequisite to Math 311 Introduction to Real Analysis. Considering the PLSO #7

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The faculty assessed three program student learning outcomes (3, 6, 7) during the 2020-21 academic year. The faculty reviewed the results during the fall term 2021 during a faculty meeting and had the following conclusions.

Outcome 3 (graphing): Students met all performance criteria and no further action is required at this time. The student performance was quite good except for one specific question. As noted above, the instructor felt that the student performance was overall excellent. Students met all performance criteria and no further action is required at this time.

Outcome 6 (abstract reasoning): Overall, the assessments results for abstract reasoning were good. There was some concern about the low scores related to the proof related to the limit of a function at a point. We will see where else in the curriculum the formal definition of the limit can be introduced. We will make a note to revisit and assess formal limit proofs again in Math 311. Students met all performance criteria and no further action is required at this time

Outcome 7 (independent learning): Overall, the assessment results were good. Students met all performance criteria and no further action is required at this time

Based on our assessment results for the learning outcomes PSLO 3, 6 and 7 no formal changes were deemed necessary.