Program Self-Assessment: BA and BS in Mathematics

Department of Mathematics and Statistics

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Undergraduate Mission Statement

The Department of Mathematics and Statistics serves the undergraduate academic community at UAF by providing a large number of mathematics service courses for other disciplines and departments, by offering majors the opportunity to learn challenging and important mathematics in upper level courses, by preparing interested students with the mathematical and analytical skills sufficient for embarking on a quantitative career and advising non-majors and majors alike about appropriate mathematics placement and courses of study. The Department seeks to offer excellent instruction at all levels of the curriculum and to meet the diverse mathematical needs of a large comprehensive university.

Strengths

Quality Undergraduates

Our outcomes assessment suggests that the department produces math majors who compare favorably with math majors from other colleges and universities. For the past seven years,

minimum of 18 sections of 100- or 200-level service courses ranging from a 100-level modern concepts of mathematics course to a 200-level calculus for business majors. In addition, we have a significant service role at the 300-level as can be seen in Table 2.

Course	Enrolled	Non-math major	Percentage
Math 302	45	42	93%

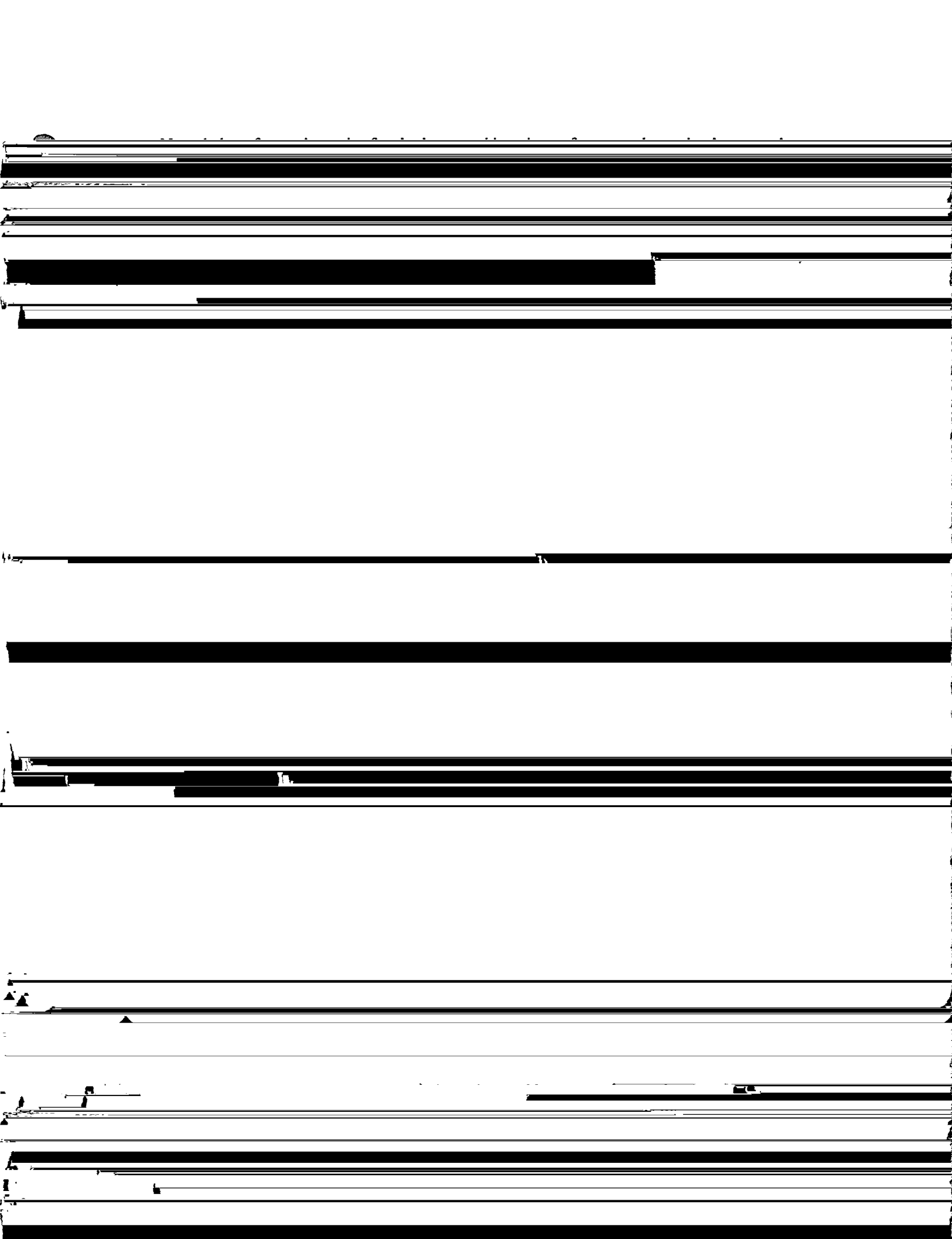
- Course development and modernization. (Eg. splitting Linear Algebra into a 200

level Matrix Algebra course and a 400 level Linear Algebra class).

- Degree requirements for math majors and minors. (Eg. streamlining the elective

adding additional electives for the math minor.)

- Alignment of UAF's mathematics curriculum with the Mathematical Association of America's Curriculum guide for mathematics instruction. (The MAA is the



Placement and Failure Rates

Math Lab

Placement Exam

We believe that a mandatory placement exam and enforcing prerequisites at registration would increase the success rates of students in lower level math courses and decrease the frustration of students who register for the wrong course.

Math Lab Coordinator

The Math Tutoring Lab can be enhanced by creating a permanent coordinator. This position would be responsible for all aspects of maintaining, enhancing, and promoting the lab. To allow for a suitable amount of energy to be directed towards the lab, the position

should be suitably compensated by means of a teaching release.

100 Level Math Coordinator

We believe the department needs to have a designated 100 level coordinator. The

Appendix 1: Informal Survey of Department Sizes

Appendix 2: Credit Hours Generated and Department Size

	Mathematics Student Credit Hours	CNSM Student Credit Hours	Percent Mathematics Student Credit Hours	Mathematics Permanent Faculty (FTE)	CNSM Permanent Faculty (FTE)	Percent Mathematics Permanent Faculty (FTE)
Spring 2000	2,688	12,131	22%	10.5	52.0	20%
Fall 2000	3,066	13,511	23%	8.5	53.0	16%
Spring 2001	3,132	12,909	24%	8.5	56.0	15%
Fall 2001	3,197	13,746	23%	9.5	60.0	16%
Spring 2002	3,004	12,901	23%	10.5	61.0	17%
Fall 2002	3,316	14,596	23%	10.5	67.0	16%
Spring 2003	3,302	13,399	25%	10.5	67.0	16%
Fall 2003	3,604	15,092	24%	10.5	67.0	16%

Fall 2005

1. At the request of the Department of Developmental Education, a toughening of

Appendix 4: Math BS/BA Assessment Plan

Date: February 2004

Certificate or Degree Program: Bachelor of Science and Bachelor of Arts in Mathematics

Appendix 5: Data from Math 490 Exit Surveys

Raw Data from Math 490 Survey Spring 2005

The survey was given to the 14 students in Math 490 Senior Seminar in Spring 2005 at the [illegible]

Expected Graduation Date

Spring 2005	Summer 2005	Fall 2005
7	2	5

Plans after Graduation

graduate school	8
work in math related field	5
work in non-math related field	0
Other	0
Unsure	4

Note, some students checked both graduate school and work in a math related field.

Responses to the statement:
I'm confident the UAF Math program adequately prepared me in _____ .

	Strongly agree	agree	neutral	disagree	strongly disagree	not applicable	total

Appendix 6: Data from Alumni Survey

Raw Data from Alumni Surveys 2005

We began tracking our graduates for the first time in 2005. In May of 2005, 22 surveys

2003. Nine surveys were returned for a response rate of 40%.

Appendix 7: 2003-2004 Assessment Report

Department of Mathematical Sciences
Assessment Report
for the
Bachelors Degree in Mathematics
2003-2004

Introduction

The Department of Mathematical Sciences (DMS) has collected information as directed by the department's Student Learning Outcomes Assessment Plan. This includes a comparison

The Major Fields Test is given each spring in Math 490, Senior Seminar. This is a required course for all math majors. Despite the name, not all students in the course are necessarily

or Math 208 Abstract Algebra. Thus, all students have completed the majority of the com-

Ethnicity Distribution Major Field Test Participants					
Year	1999	2000	2001	2002	2003

equations, linear algebra and/or discrete mathematics without completing the calculus prerequisites. Students doing this often fail or do poorly in these courses. As a result, the chair has recommended better enforcement of the prerequisites to help ensure student success in these courses.

V. List of Graduates

The following are the students who graduated during the past academic year (03-04).
Justin N. Carstens
Edward M. Eckles
Joel D. Eichler
Jennifer E. Erland
Vaughn T. Ewig
Paloma Harbour
Andrew S. Johnston
Jed Kallen-Brown
Mathew S. Moore
Tony Perkins
William M. Robb
Melanie R. Wagoner

[redacted]

The department had two teams compete in the Mathematical Contest in Modeling this spring. The MCM is an international competition. This year 599 teams participated. One of our teams received a rating of Honorable Mention for their solution. This rating was given

[redacted]

In addition 6 students took the Putnam Exam this fall. The organizer of this contest at UAF

[redacted]

Ed Bueler, wrote the following summary.

hope this will increase the success rate of students in Math 200. The data collected can be found in the appendix.

- The department voted to change the W courses in Math. Specifically, we decided to change Math 208 Abstract Algebra to a W and to delete the W from all other courses except Math 401 Advanced Calculus. As a result of this change, all students who complete our math core will automatically get the two W's needed for the core curriculum and eliminate the struggle of some students to satisfy this requirement.

Suggested Actions

Below is a list of issues raised by the assessment process or other activities that we suggest the department address in the Fall if not sooner.

- Based on the Chair's analysis of transcripts, the department should change the requirements for a math minor such that a grade of C or better is required in all math

Appendix 8: 2004-2005 Core Curriculum Assessment Report

[redacted]

For
Core Classes
In the
Mathematical Sciences

June 2005

[redacted]

David Maxwell

Outline

I. **Introduction**
II. **Methodology**
III. **Discussion of specific courses**
IV. **Conclusions & recommendations**
V. **Data Collected**

I. Introduction

The Department of Mathematical Sciences has completed its review of the core mathematics courses for 2005. A special committee, formed for the purpose of assessing the mathematics core, met in May 2005 to gather the data presented in this report. The Mathematical Sciences Department currently offers eight core courses, of which four were reviewed by the committee. The personnel resources of the committee made it difficult to include more courses and at the same time have an equitable allocation of assessment duties.

[redacted]

However, we were able to give a more thorough coverage to Math 107 than has been given in the past.

[redacted]

The third outcome concerns content related objectives that are unique to each individual course. Thus, this outcome will be split into several specific concepts listed under the separate courses.

In addition, we included a fourth criterion for Math 107 and 161.

4. Students have mastered the prerequisite material for the course.

the problem of incorrect student placement, which has been recognized as a problem for our courses.

For each outcome, including the various content related objectives, we chose one or two

Observations from 2005 Assessment

[redacted]

was split into the following objectives specific to Math 107.

a) Understanding the nature of functions
b) Solving equations
c) Graphing basic functions (polynomial, rational, exponential, and logarithmic functions, and functions containing radicals)
d) Understanding the properties of exponential and logarithmic functions

further prepare students for Calculus. Second, we can allow more time for students to review the prerequisites for the course as well as more time for students to learn and absorb the new material.

We received only two small samples of Math 107 exams from a single College of Rural Alaska instructor. Though the outcome scores were consistent with the overall Math 107

Math 131X Concepts and Contemporary Applications of Mathematics

Introduction

The content of Math 131 is chosen in an attempt to make a more relevant and meaningful

Math 161 Algebra for Business and Economics

Introduction

The primary goal of this course is to prepare students to take Calculus for Business and Economics. It covers a wide range of topics such as algebra, graphing, logarithms and exponential functions, mathematics of finance, and linear algebra. Because of the large number of topics that must be covered the syllabus for this course is fairly rigid. This fixed

Math 200X, 201X, 202 - Calculus I, II , III

Introduction

Math 200 is the first course in a three-semester calculus sequence for the physical sciences. Math 201 is the second course, and Math 202 is the third. These courses must cover a lot of ground and the syllabi are fairly rigid. Individual instructors are required to adhere to the

word problem or application, which are often the most difficult problems on a final and used as differentiators between the A and B students.

The two different sections of 262 assessed this year have extremely different scores for two of the above low-scoring outcomes, namely outcomes 1 (problem solving skills) and 3e (application of integration and differentiation). The main reason for the different scores in

Observations from 2005 Assessment

The committee assessed the four criteria listed under section II on methodology. Outcome 3 was split into the following objectives specific to Math 272.

a) Limits and continuity

b) Differentiation and integration – calculations
c) Maximization/minimization problems
d) Analysis of functions of one variable and their graphs
e) Applications of integrals and derivatives
f) Differentiation and integration – concepts
-knowing how derivatives and integrals are related to graphs
-having the ability to discern whether differentiation or integration is involved
-understanding how a derivative and an integral relates to the original function

Student outcomes were best in the areas of manipulating abstract symbols, limits, and

IV Conclusions

Math 107 regarding Graphing & the Calculator

A survey was conducted in order to ascertain the expectations professors had on students entering calculus. Four UAF professors who teach calculus were asked the following:

1 said **YES**
3 said **NO**

Recommendations from 2005 Assessment

1. Put more effort into retrieving exams from the College of Rural Alaska.

3. Come up with a consensus on calculator use for Math 107 final exams.
4. Determine 2 or 3 specific outcomes to be assessed for next Assessment Report and ensure that they are well represented on the final exams.

Outcome Data for 2005 Assessment

Math 262	23 exams assessed

	Math 107	Assessment 2005			Assessment 2003		
	Outcome	average out of 4	average out of 100	% at 3 o 4	average out of 4	average out of 100	% at 3 o 4
1	Problem solving skills	2.3	58	42	2.2	55	32
2	Manipulate abstract symbols	2.6	66	57	3.3	82	79
3a	Nature of functions	2.5	63	47	2.6	65	48
3b	Solving equations	3.0	74	67	3.0	75	68
3c	Graphing basic functions	2.5	62	51	3.3	83	76