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Review of Graduate Degree Programs in Mathematics, 2005-06

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Contents

Preamble

The goal of our review has been to identify some of the strengths, weaknesses, needs and significant changes in the three graduate mathematics degrees offered by the UAF Department of Mathematics and Statistics: MS Mathematics, MAT Mathematics, and PhD Mathematics.

These three graduate mathematics degree programs are built from a common set of courses and faculty, but they are otherwise very different from each other. Each of the sections below will be headed by comments which apply to all degree programs and then by comments for each degree program separately.

courses is one of our **strengths**. (The number of student credit hours offered by the Department of Mathematical Sciences is largest in the college, though tied with Biology

service load DMS carries, as non-major credit hours per faculty member, far exceeds any other CNSM department.)

Of these seven MS graduates, two currently work as instructors in mathematics at the college level:

- Bowman is an instructor in Mathematics in DMS here at UAF,
- Carlson is an instructor in Mathematics at North Country Community College, State University of New York.

The remaining five are in PhD programs of the highest quality:

- Averina is in a PhD Applied Mathematics program at the University of Minnesota, Twin Cities,
- Belov is in a PhD Mathematics program at Duke University,
- Filipov is a PhD Economics program at Ural State University, Russia

[redacted]

Mathematical Sciences, New York University,

- Nikolsky is in an Interdisciplinary PhD program in Geophysics and Mathematics here at UAF.

This is evidence of the success of our MS graduates and, at least in part, represents a **strength** of the MS program.

[redacted]

plus and occasional B, etc.) in junior-senior level mathematics courses involving proofs.

[redacted]

Starting in 2000, and with the encouragement of the Dean of GSEM, among others, the [redacted]

Weaknesses

Weaknesses of all degree programs : The primary **weakness** of our graduate program is the small size of the faculty. The 8.5 FTE tenure-track and tenured faculty, along with 2 permanent instructors are, in total, in charge of five degree programs (BA, BS, MS, MAT, and PhD in Mathematics) and teach the largest load of service courses in the College and possibly the University.

During the fall of 2005, prompted in part by recent faculty turnover and in part by this review process, the Department of Mathematics and Statistics has engaged in sustained

- Math/CS 661 Optimization [cross-listed]
- Math 662 Applied Combinatorics and Graph Theory

of students, must be reduced, and this reduces the utility of such a course to those who need training in creating new mathematics, that is, to Mathematics graduate students.

In conclusion, we note that even if DMS ceased to offer graduate degree programs in Mathematics, other departments would still need these service courses at the graduate

course to our offerings. (There are, as well, faculty in the Department of

therefore, a candidate for cross-listing if both faculties were so inclined.)

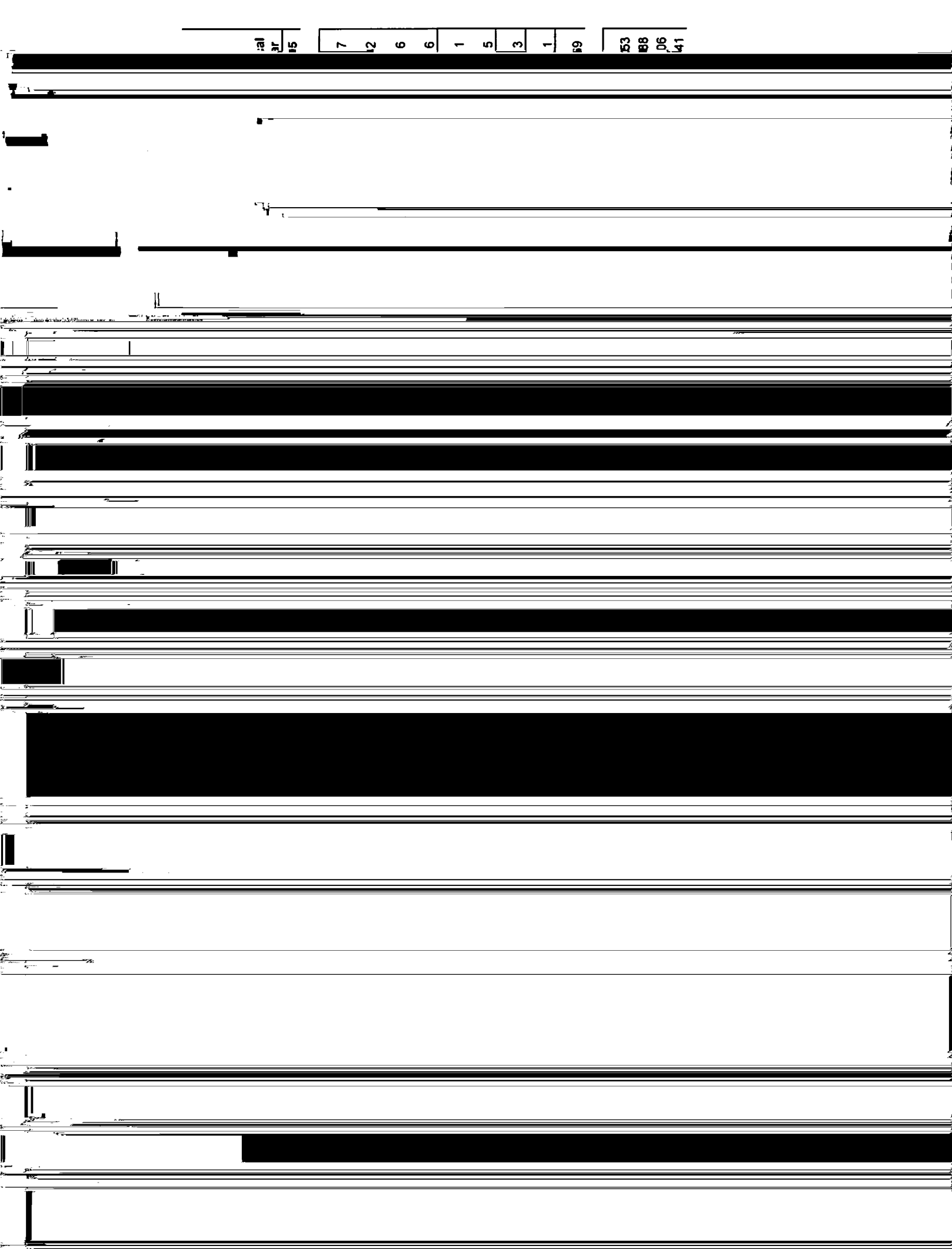
3. A revision of the catalog descriptions of the cross-listed courses Math/Phys 611/612 is underway. Agreement between the faculties on a written draft has

Needs

A comparison to other PhD-granting mathematics departments (in the lowest tier as rated by the American Mathematics Society) is illuminating. See appendix 7, which reports an informal survey of the sizes of these departments.

[redacted]

- weakness of mathematical journals collections in the library.



Sum
mar
2005
407
87
1
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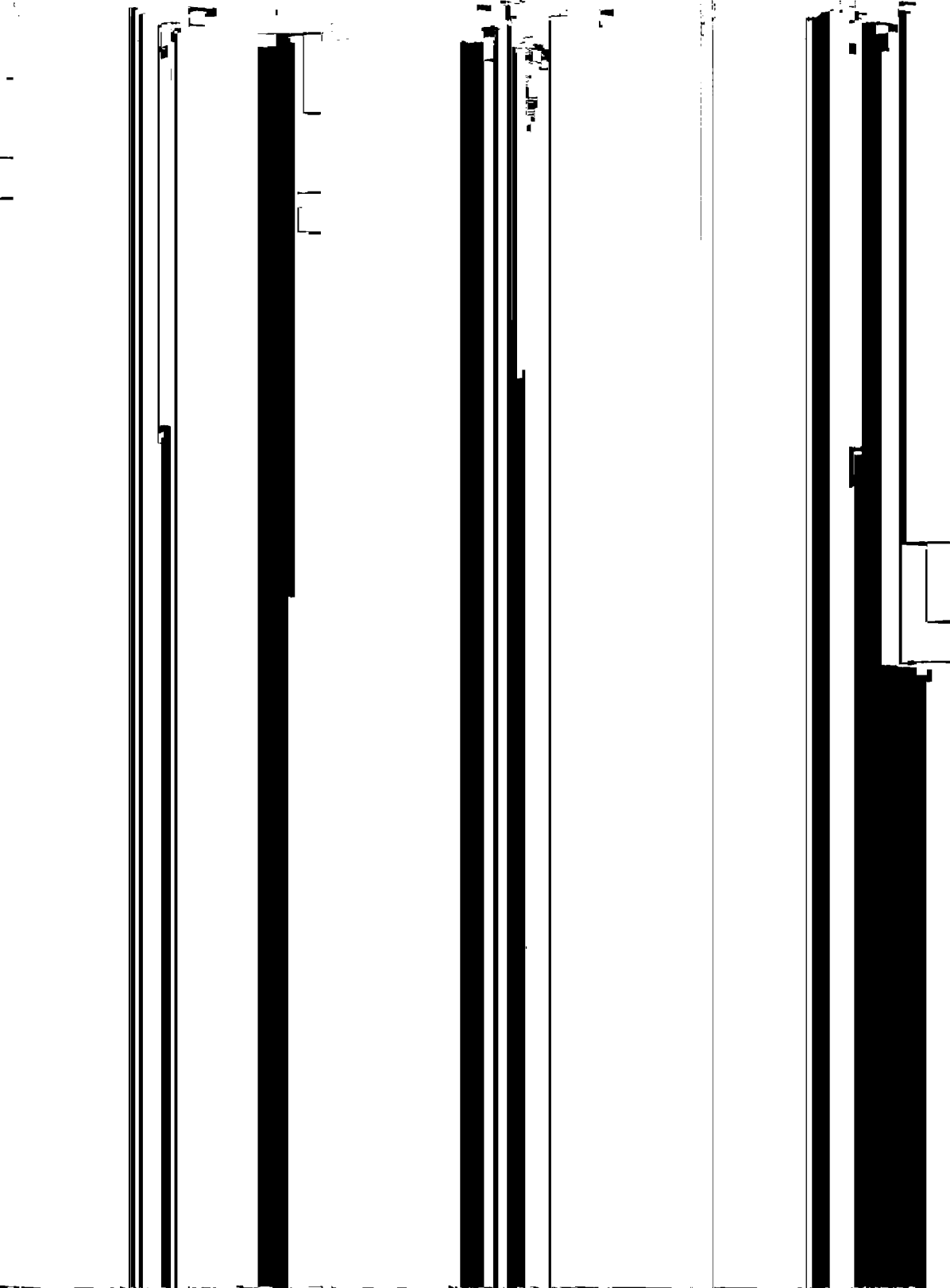
3
650



2002	2003	2004	2005
	1	1	2
3 1	9 1	10 1	8
1	4 3	1 5	2 1
5	18	18	13

Appendix 4 – Student Learning Outcomes Assessment Plan

Date: February 2004

Certificate or Degree Program: Master of Science, Master of Arts in Teaching

and Doctor of Philosophy

Mission: We shall provide quality education responsive to the needs of individual students and the diverse population of Alaska.

Goal: To ensure that our graduates are adequately prepared to succeed in the

job market in mathematics or a closely related field.

INTENDED	ASSESSMENT CRITERIA	IMPLEMENTATION PROCEDURES (what, when, who)

[redacted]

The Outcomes Assessment Report prepared in March 2005 appears on the following pages.

For the
M.S., M.A.T and Ph.D. in Mathematics
2004-2005

Introduction

[redacted]

Math 651 Topology. The third exam may be taken from any 600-level mathematics

New exams are created for each round of comprehensive exams. Typically the faculty member who taught the course writes the exam, but a second faculty member reviews the

exam before it is given to the students. If the student exam is not one of the core

III. Summary of Recently Graduated Students.

Below is a complete list of graduate students in our department who have graduated since 1999. We include our expected Spring 2005 graduates. This alphabetical list includes their name, thesis/project title, date (or expected date) of graduation and if they have graduated, we indicate their current position.

Our Ph.D. program is now at the stage of reconstruction. Currently we have four Ph.D.

- As is noted in part I the Universities of Idaho, Wyoming and North Dakota are in

institutions is more than twice that for UAF. The small size of our faculty makes the job of running a graduate program, especially a Ph.D. program, very labor

Appendix 5 – Responses to a survey of recent MS alumni

In Summer 2005 an alumni survey was sent to graduates of the M.S. program with graduation dates between 2000 and 2004. (There were no M.A.T. or Ph.D. graduates in this period.) This survey is part of the department's assessment plan (see Appendix 4).

Five surveys were sent and four returned for a return rate of 80%. The responses follow on the next eight pages.

Department of Mathematics and Statistics

Master's Degree Program

[redacted]

For each of the following fields, please indicate your response to the statement "The UAF Math program [redacted]"

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
Abstract Algebra	☐	☐	☑	☐	☐	☐
Real Analysis	☑	☐	☐	☐	☐	☐
Topology	☐	☑	☐	☐	☐	☐
Complex Analysis	☐	☐	☐	☑	☐	☐

If you marked "Disagree" or "Strongly Disagree" in any of the above categories, please give details:

I've learned only basic techniques and didn't see deep connections to other topics (like real analysis, [redacted] the course.

The purpose of this survey is to collect information from [illegible]

For each of the following fields, please indicate your response to the statement "The UAF Math program [redacted]"	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
Abstract Algebra	☐	☐	☒	☐	☐	☐
Topology	☐	☒	☐	☐	☐	☐
Complex Analysis	☐	☐	☐	☒	☐	☐

If you marked "Disagree" or "Strongly Disagree" in any of the above categories, please give details:
(See least beneficial)
I don't feel that I learned anything in this class... I do know the book well but if asked to elaborate on any of the

For each of the following fields,

Department of Mathematics and Statistics

Master's Degree Program

The purpose of this survey is to collect information from our graduates in order to improve our program. Your name is not requested on this form so your responses are anonymous. Only summaries of responses will be reported and used for curricular

For each of the following fields,

adequately prepared me in ____"

Abstract Algebra	☐	☐	X	☐	☐	☐

Appendix 6 –Current Students and Recent Graduates (since 2000)

Alphabetical list of current students with admission semester ("S0x" for Spring or "F0x"

[redacted]

Anthony, Amy (F05, MS); *on leave Fall 2005*
Bulanova, Anna (S03, PhD); *Aydonin*

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

School	Math faculty	Comments (+ indicates estimate is probably very conservative)
University of Alaska, Fairbanks	8.5	one faculty member has joint appointment with Education
Bowling Green State University	16	
Clarkson University	10	
Colorado School of Mines	8	
Drexel University	15	+
George Washington University	18	
Howard University	28	
Idaho State University	19	
New Mexico State University, Las Cruces	24	
Northern Illinois University	21	+
Ohio University, Athens	20	+
Old Dominion University	17	specialties in applied math, [illegible] stats
Southern Illinois University, Carbondale	30	
Southern Methodist University	20	very applied focus
St. Louis University	28	
Stevens Institute of Technology	15	+ postdocs

Appendix 8 – Current UAF catalog descriptions

B.A., B.S., M.A.T., M.S., Ph.D. Degrees

Minimum Requirements for Degrees: M.A.T.: 36 credits; M.S.: 30-35 credits; Ph.D.: 18 thesis credits

The number of new fields in which professional mathematicians find employment grows continually. This department prepares students for careers in industry, government and education.

The M.S. in mathematics prepares students for Ph.D. work, in addition to providing a terminal degree for those planning to enter industry or education. The M.A.T. degree prepares graduates to teach secondary school mathematics. The aim of the Ph.D. program is to provide the student with the expertise to accomplish significant research in applied or pure mathematics, as well as to provide a broad and deep professional education.

In addition to the major programs, the department provides a number of service courses in support of other programs within the university. Current and detailed information on mathematics degrees and course offerings is available from the department.

The department maintains a math lab for all students studying mathematics at the

The Department of Mathematical Sciences also offers programs in computer science and statistics (see separate listings).

Graduate Program--M.A.T. Degree

1. Complete the following admission requirements:
    a. The department does not require any GRE, but recommends applicants provide GRE general scores.
    b. Complete and submit a TOEFL score of at least 600 (this requirement is only for foreign applicants who seek a teaching assistantship).
    c. The department gives preference to foreign applicants who also submit results of the Test of Spoken English (TSE).
2. Complete the general university requirements.
3. Complete the M.A.T. degree requirements.
4. Complete the following:
   MATH courses* 18
5. Minimum credits required 36

Appendix 9 – Responses to a survey of DMS faculty on the future of Mathematics

On 18 October 2005, one faculty member created the survey which follows and sent it to all tenured and tenure-track faculty in Mathematics. All replied. The replies appear on the next page. They have been made anonymous.

The purpose of the survey was to explore the current state of opinion on our graduate programs and the extent of each faculty member's commitment to each program in terms of advising students.

A summary of those opinions which are either unanimous, or reflect a majority opinion in the department, includes the following:

Survey:

whether or not we want a PhD program? (That is, how many permanent PhD-in-Mathematics-possessing tenure-track faculty?)

I: 12 to 16 such faculty
II: 15-20
III: 15
IV: 18
V: The numbers suggested in the mid-teens sound great to me. But this is, in some sense, a selfish want, and I'm still not sure how big a math department UAF needs

VIII. I'm not sure what to answer this one either. Under which category should I

VII: I think it's best to officially keep it. For some students and advisors it may be effective, and it does keep options open for everyone. The question in my mind is more about how much it should be emphasized.

VIII: Yes. We have some PhD students which are both PhD material and right for our program. By talking about closing our PhD program we are actually betraying them.

[redacted]

Appendix 10 – Enrollment in graduate mathematics courses since Fall 2000

Enrollment (sections) by semester 2000-2005

421	21		9		8		18		24		8	
422		16		10		20		19		22		Scheduled
460	11		6		Cancel		Cancel		Cancel		Cancel	
600	7		5		4		Cancel		Cancel		Cancel	
608					3				6			
611	?		5?		?		18?		?		6	
612		?		6?		?		10?		?		Scheduled
615				10				Cancel		15		
621												
630	Cancel						9					

Appendix 11 – Publications by graduate students, 2000-2005

[redacted]

Comprehensive Exams for MS and PhD in Mathematics in Spring/Summer 2006

Appendix 13 – Salary comparison based upon Oklahoma Survey and American

Finally, we report the American Mathematical Society data (2004 *Annual Survey of*

Mathematical Sciences, Notices of the American Mathematical Society, Vol. 52, no 2 (2005), p. 236-251). The AMS is one of several possible sources for this data, but it is most appropriate to the largest group of faculty in DMS (namely, tripartite mathematics faculty). Here there are three "Groups" of universities to compare to. UAF is part of Group III, which are PhD-granting departments ranked too low (by AMS) to appear in