OKLAHOMA STATE UNIVERSITY
ACADEMIC PROGRAM REVIEW
EXECUTIVE SUMMARY

DEPARTMENT OR DEGREE PROGRAM: Mathematics

This report was written by Alan Adolphson (Department Head) with assistance from J.R. Myers (Graduate Director), John Wolfe (Undergraduate Director), Dennis Bertholf (Assessment Director), and William Jaco (Kerr Professor of Mathematics). We expect to conduct an external review in the near future, and this Academic Program Review will be available for the outside reviewers to consult.

The objectives of our bachelors programs are to prepare students to think analytically, to solve problems, to communicate precisely, and to use basic methods of modern mathematics in a variety of contexts including teaching, business, industry, and graduate programs. The objectives of our masters program are to prepare students to work in business or industry, teach in high school or at the community-college level, or enter a doctoral program. The objectives of our Ph. D. program are to prepare students to conduct mathematical research and teach at the college or university level.

Our outcomes assessment indicates that our B. S. and B. A. programs are successful in meeting their objectives. Because of recent changes in uor masters program, we are developing a new assessment instrument for that group. Our Ph. D. program is successful when measured by quality but not when measured by quantity. Our Ph. D. graduates are generally pleased with their preparation and go on to successful careers, but we are not currently meeting the Regents' productivity requirements. We have made changes in our Ph. D. program to address this problem and we continue to monitor closely the status of students in that program.

Our basic recommendation is that the mathematics program at OSU should be expanded. In our increasingly technological society, the applications of mathematics are growing. We should hire more faculty with expertise in some of these emerging applied areas. This will attract more undergraduate majors and graduate students who are interested in these areas. The teaching assistant budget should be increased to provide a greater population of strong graduate students to assist on faculty research projects and to provide classroom instruction, reducing our reliance on the use of adjunct faculty.

Dean_____   Date__March 2, 2005__

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

Bachelor of Science in Mathematics
Title of unit or degree program reviewed (Level III)

With options (Level IV) in: _____

_____

Arts and Sciences
Degree designation as on diploma (Level II)

BS
Formal degree abbreviation (Level I)

Degree-granting academic unit   Mathematics   217

(Name)   (Cost Center)

CIP code   270101

HEGIS code   1701

Instructional Program code   141

Name of department head   Alan Adolphson
(person who oversees degree program listed above)

Program holds specialized accreditation from _____

Name and title of contact person   Alan Adolphson
(Name)
Regents Professor and Head
(Title)

Date of Institutional Governing Board Review: _____

President _____   Date: _____
(Signature)

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

Masters of Science in Mathematics
Title of unit or degree program reviewed (Level III)

With options (Level IV) in:

Arts and Sciences
Degree designation as on diploma (Level II)

MS
Formal degree abbreviation (Level I)

Degree-granting academic unit   Mathematics   217

(Name)   (Cost Center)

CIP code   270101

HEGIS code   1701

Instructional Program code   142

Name of department head   Alan Adolphson
(person who oversees degree program listed above)

Program holds specialized accreditation from

Name and title of contact person   Alan Adolphson
                                (Name)
                     Regents Professor and Head
                              (Title)

Date of Institutional Governing Board
Review:

President   Date:
                  (Signature)

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

PhD in Mathematics
Title of unit or degree program reviewed (Level III)

With options (Level IV) in: _____

_____

Arts and Sciences
Degree designation as on diploma (Level II)

PhD
Formal degree abbreviation (Level I)

Degree-granting academic unit   Mathematics   217

                                            (Name)   (Cost Center)

CIP code   270101

HEGIS code   1701

Instructional Program code   143

Name of department head   Alan Adolphson
(person who oversees degree program listed above)

Program holds specialized accreditation from   _____

Name and title of contact person   Alan Adolphson
                                            (Name)
                               Regents Professor and Head
                                            (Title)

Date of Institutional Governing Board
Review: _____

President   _____   Date: _____
                           (Signature)

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

Bachelor of Arts in Mathematics
Title of unit or degree program reviewed (Level III)

With options (Level IV) in:

Arts and Sciences
Degree designation as on diploma (Level II)

BA
Formal degree abbreviation (Level I)

Degree-granting academic unit | Mathematics | | 217
| (Name) | (Cost Center)

CIP code   270101

HEGIS code   1701

Instructional Program code   254

Name of department head   Alan Adolphson
(person who oversees degree program listed above)

Program holds specialized accreditation from

Name and title of contact person   Alan Adolphson
(Name)
Regents Professor and Head
(Title)

Date of Institutional Governing Board
Review:

President _____   Date: _____
(Signature)

OVERVIEW

A. Description of the Departmental/Program Review Process The review process was led and coordinated by Alan Adolphson (Department Head) with input from J. R. Myers (Graduate Director), John Wolfe (Undergraduate Director), Dennis Bertholf (Assessment Director), and William Jaco (Kerr Professor of Mathematics)

B. Recommendations from Previous Program Reviews There has been little progress towards accomplishing any of the recommendations from the previous program review. Those recommendations were to increase the numbers of faculty, graduate students, and undergraduate majors; increase the maintenance budget; obtain funding for a postdoctoral program, a second endowed chair, an endowment for undergraduate scholarships; establish a larger presence at OSU-Tulsa. All of these goals require increased funding. The only increase we have seen is a somewhat larger endowment for undergraduate scholarships resulting from private donations.

CRITERION I

Program Centrality

A. Goals & Objectives of Degree Programs

Degree Program: Bachelor of Science
Program Clientele: Primarily full-time traditional college-age students in Stillwater with an interest in mathematics and the sciences
Program Objectives: Prepare students to think analytically, to solve problems, to communicate precisely, and to use basic methods of modern mathematics in a variety of contexts including teaching, business, industry, and graduate programs
Expected Student Outcomes: Students will have a knowledge of the basic elements of modern mathematics, be able to reason and communicate effectively and be able to solve technical problems, be satisfied with their mathematical preparation at the time of graduation and at intervals of two and five years later, upon graduation find suitable employment or enter a graduate program, and be successful in their chosen careers.

Degree Program: Bachelor of Arts
Program Clientele: Primarily full-time traditional college-age students in Stillwater with an interest in mathematics, arts and humanities, and foreign languages
Program Objectives: Same as for the BS degree
Expected Student Outcomes: Same as for the BS degree

Degree Program: Master of Science
Program Clientele: Primarily full-time traditional college-age students in Stillwater
Program Objectives: Prepare students to work in business or industry, teach in high school or at the community-college level, or enter a doctoral program
Expected Student Outcomes: Students will have a knowledge of beginning graduate courses in analysis, algebra, and topology or numerical analysis, be able to reason and communicate effectively and be able to solve technical problems, be satisfied with their mathematical preparation at the time of completion of the program and at intervals of two and five years later, find suitable employment or enter a doctoral program upon completion of their program, and be successful in their chosen careers.

Degree Program: Ph. D.
Program Clientele: Primarily full-time traditional college-age students in Stillwater
Program Objectives: Prepare students to conduct mathematical research and teach at the college or university level
Expected Student Outcomes: Students will have a broad knowledge of mathematics with a deep knowledge of a specific area, be able to reason and communicate effectively and be able to solve advanced technical problems, be satisfied with their mathematical preparation at the time of completion of the program and at intervals of two and five years later, find suitable employment upon completion of their program, and be successful in their chosen

careers.

B. Linkage of the Program to Institution's Mission Mathematics is a key tool in all areas of science and technology. By training people to use, teach, and create mathematics, our programs contribute to the advancement of knowledge, technological progress, and economic development in the state of Oklahoma.

CRITERION II
Program Curriculum and Structure

A. Program Structure The Math Department offers the BS and BA degrees in mathematics, the MS in mathematics (with three possible specializations: pure mathematics, applied mathematics, and mathematics education) and the Ph. D. in mathematics (with three possible specializations: pure mathematics, applied mathematics, and mathematics education). The degree requirements sheets for each of these programs are attached.

B. Distance Education The Math Department offers Math 2144 (Calculus I) over the internet. We offer several courses through Independent and Correspondence Study: Math 1483 (Mathematical Functions and Their Uses), Math 1513 (College Algebra), Math 1613 (Trigonometry), Math 1715 (College Algebra and Trigonometry), Math 2103 (Elementary Calculus), Math 2123 (Calculus for Technology Programs I), Math 2145 (Calculus I), Math 2233 (Differential Equations), Math 2910 (Special Studies: The Metric System), Math 3013 (Linear Algebra).

C. Articulation Agreement The Math Department has a 2 + 2 articulation agreement with Tulsa Community College.

D. Multidisciplinary Programs The Math Department encourages interaction between faculty in Mathematics, Statistics, Computer Science, Physics, and Engineering. Faculty in these departments occasionally participate in each other's seminars and one of our faculty recently submitted a joint grant proposal with a faculty member in the College of Engineering.

OKLAHOMA STATE UNIVERSITY

GENERAL REQUIREMENTS

For students matriculating:
Academic Year . . . . __2004-2005__
Total hours . . . . __120__
Minimum overall grade-point average __2.00__
Other GPA requirements, see below

COLLEGE OF ___ARTS & SCIENCES___

BACHELOR OF ___SCIENCE___
___DEGREE___
___MATHEMATICS___
MAJOR

General Education Requirements __40__ Hours		
Area	Hrs	To Be Selected From
English Composition and Oral Communication	6	ENGL 1113 or 1313; and 1213 or 1413 or 3323 (See Academic Regulation 3.5 in Catalog.)
American History and Government	6	HIST 1103 POLS 1113
Analytical and Quantitative Thought (A)	7	MATH 2144 CS 1103 or 1113
Humanities (H)	6	Courses designated (H).
Natural Sciences (N)	8	PHYS 2014 or 1114 PHYS 2114 or 1214
Social and Behavioral Sciences (S)	6	Courses designated (S).
International Dimension (I)	-	Course designated (I). (see note 1.b.)
Scientific Investigation (L)	-	Course designated (L). (see note 1.b.)
Controlled Electives	1	Any course with a GE designation in any of the above areas.

College/Departmental Requirements __13__ Hours		
Orientation	1	A & S 1111 (transfer students with 15 hours exempt)
Arts and Humanities	3	
		(see note 2.a.)
Natural and Mathematical Sciences	9	
		(see note 2.b.)

Major Requirements __42__ Hours
A minimum grade of "C" in each course. MATH 2153, 2163, 2233, 3013, 3613, 4023 12 hours from: MATH 3653, 4013, 4143, 4153, 4233, 4283, 4403, 4513 4553, 4583, 4613, 4663, 4713, 4813, 5013, 5023, 5303, 5593 6 hours from: Mathematics or Statistics courses numbered 4000 or above or from upper-division courses in Computer Science or Physics. 6 hours from: upper-division courses in any field.

Electives __25__ Hours
15 hours may need to be upper division.

Other Requirements: See notes 1, 2 & 3 on back of degree sheet.
    Foreign Language Proficiency: See note 3 on back of sheet.
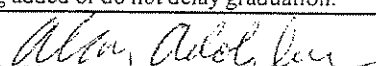   Upper-Division Gen Ed: 6 hours outside major prefix.
    Upper-Division Credit: Total hours must include at least __48 hours__ in courses numbered 3000 or above.
    Hours in One Prefix: Hours in one prefix in excess of 48 will be added to the minimum total of 120 required for graduation.

Students will be held responsible for degree requirements in effect at the time of matriculation (date of first enrollment) & any changes that are made, so long as these changes do not result in semester credit hours being added or do not delay graduation.

DEAN   AS - 47   DEPARTMENT HEAD

OKLAHOMA STATE UNIVERSITY

GENERAL REQUIREMENTS

COLLEGE OF ARTS & SCIENCES

BACHELOR OF ARTS DEGREE

MATHEMATICS MAJOR

For students matriculating:

Academic Year 2004-2005

Total hours 120

Minimum overall grade-point average 2.00

Other GPA requirements, see below

General Education Requirements 40 Hours		
Area	**Hrs**	**To Be Selected From**
English Composition and Oral Communication	6	ENGL 1113 or 1313; and 1213 or 1413 or 3323 (See Academic Regulation 3.5 in Catalog.)
American History and Government	6	HIST 1103 POLS 1113
Analytical and Quantitative Thought (A)	7	MATH 2144 CS 1103 or 1113
Humanities (H)	6	Courses designated (H).
Natural Sciences (N)	8	PHYS 1114 or 2014; PHYS 1214 or 2114
Social and Behavioral Sciences (S)	6	Courses designated (S).
International Dimension (I)	-	Course designated (I). (see note 1.b.)
Scientific Investigation (L)	-	Course designated (L). (see note 1.b.)
Controlled Electives	1	Any course with a GE designation in any of the above areas.

College/Departmental Requirements 23 Hours		
Orientation	1	A & S 1111 (transfer students with 15 hours exempt)
Arts and Humanities	9	(see note 2.a.)
Natural and Mathematical Sciences	3	(see note 2.b.)
Foreign Languages	10	(see note 3.)
Non-Western Studies	-	(see note 1.b. and 2.c.)

Major Requirements 42 Hours

Minimum grade of "C" in each course.

MATH 2153, 2163, 2233, 3013, 3613, 4023

12 hours from:
MATH 4013, 4143, 4153, 4233, 4283, 4403, 4513, 4553, 4583, 4613, 4663, 4713, 4813, 5013, 5023, 5303, 5593

6 hours from Mathematics or Statistics courses numbered 4000 or above or from upper-division courses in Computer Science or Physics.

6 hours from upper-divison courses in any field.

Electives 15 Hours

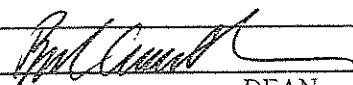All of these may need to be upper division.

Other Requirements: See notes 1, 2 & 3 on back of degree sheet.

Upper-Division Gen Ed: 6 hours outside major prefix.
Upper-Division Credit: Total hours must include at least 48 hours in courses numbered 3000 or above.
Hours in One Prefix: Hours in one prefix in excess of 48 will be added to the minimum total of 120 required for graduation.

Students will be held responsible for degree requirements in effect at the time of matriculation (date of first enrollment) & any changes that are made, so long as these changes do not result in semester credit hours being added or do not delay graduation.

DEAN   AS - 15   DEPARTMENT HEAD

Departmental Requirements:

Master of Science Degree

Pure Mathematics

The Master of Science Degree in Pure Mathematics requires that the student demonstrate knowledge in certain core areas. There are two options for doing this. Both options require a student to earn a grade of A or B in a prescribed 18 hours of core courses.

Core Courses

Option I:
1. Advanced Calculus I and II (Math 4143 and 4153)
2. Modern Algebra I and II (Math 4613 and 5013)
3. General Topology (Math 5303)
4. Complex Variables (Math 4283)

Option II:
1. Real Analysis I & II (Math 5143, Math 5153)
2. Complex Analysis I & II (Math 5283, Math 5293)
3. Geometric Topology & Algebraic Topology (Math 5313, Math 6323)
4. Algebra I & II (Math 5613, Math 5623)

Courses taken as an undergraduate can be used to satisfy the above requirements, as long as they are consistent with the Graduate College requirements. Any of the courses in Option I may be replaced by the corresponding higher level course in Option II, which has it as a prerequisite, e.g., Math 4143 (Advanced Calculus I) may be replaced by Math 5143 (Real Analysis I), etc.

Sample Plans of Study(link) are provided below.

Courses Taken in Graduate School

The courses taken in graduate school must total at least 32 hours which may include two hours credit for a Master's report. If a student elects to write a thesis, the minimum number of hours is reduced to 30. The courses taken on the Master's degree program must include at least 21 hours of mathematics, statistics, or computer science courses numbered 5000 or above of which 20 hours must be from mathematics, statistics or computer science courses. (Math 4613, Math 4143 and Math 4153 are counted as 5000 level courses for this purpose.) No more than 6 hours outside the mathematical sciences (mathematics, statistics and computer science) will count towards the Master's degree. All the courses on the Master's degree program must constitute a coherent whole and must be approved by the student's advisory committee.

Creative Component, Report, or Thesis

Each student must complete either a creative component, a report, or a thesis. Under any of these three options, a written document and a public presentation based on this individually directed project is required.

Other Requirements

The University Catalog contains detailed procedures and requirements applicable to all Master's degrees.

Departmental Requirements:

Master of Science Degree

Computational and Applied Mathematics

The Master of Science Degree in Computational and Applied Mathematics requires that the student demonstrate knowledge in certain core areas.

Core Course Requirements

All candidates for the M.S. Degree in Computational and Applied Mathematics must earn a grade of A or B in a prescribed 18 hours from the following list of core courses.

1. **Basic Mathematics (3 hours):** One of Math 4143 (Advanced Calculus, I) or Math 5023 (Advanced Linear Algebra).
2. **Numerical Analysis (3 hours):** One of Math 5543 (Numerical Analysis for DE) or Math 5553 (Numerical Analysis for Linear Algebra).
3. **Applied Analysis (12 hours):** Four from Math 4233 (Intermediate Differential Equations), Math 4283 (Complex Variable), Math 4513 (Numerical Analysis), Math 4553 (Linear and Nonlinear Programming), Math 5213 (Fourier Analysis), Math 5233 (PDE), Math 5243 (ODE I), Math 5253 (ODE II), Math 5523 (Calculus of Variation and Optimal Control), Math 5543 (Numerical Analysis for DE), Math 5553 (Numerical Analysis for Linear Algebra), Math 5580 (Case Studies), Math 5593 (Methods in Applied Mathematics).
4. **Industrial Experience:** Three hours credit under Requirement 3. for Math 5580 or an industrial experience, such as a summer internship or employed full-time for one-half year or more in industry or business in a mathematical context.

Alternative Course Selections

a. Any of these 18 hours of core courses may be replaced by a higher level course for which it is a prerequisite, e.g., Math 4143 (Advanced Calculus,I) may be replaced by Math 5153 (Real Analysis).
b. A requirement may be fulfilled by another course, such as a Topics Course or a graduate-level course in engineering or another applied science, with the advanced consent from the student's advisor and the Graduate Committee.
c. A course chosen to satisfy one of the requirements 1 through 4 may not be used to satisfy another core requirement, except Math 5580 (3 hours) may be used to satisfy both Requirements 3 and 4.

d. Courses taken as an undergraduate can be used to satisfy the above requirements, as long as they are consistent with the Graduate College requirements.

Courses outside the Mathematics Department must be approved by the student's advisory committee. Computer Science courses must be beyond programming courses (COMSC 4113 is considered a programming course).

Sample Plans of Study(link) are provided below.

Courses Taken in Graduate School

The courses taken in graduate school must total at least 32 hours which may include two hours credit for a Master's report. If a student elects to write a thesis, the minimum number of hours is reduced to 30. The courses taken on the Master's degree program must include at least 21 hours of courses numbered 5000 or above of which 20 hours must be mathematics, statistics, or computer science courses. (Math 4613, 4143 and 4153 are considered 5000 level courses for this purpose.) No more than 6 hours outside the mathematical sciences will count towards the Master's degree. An advanced letter of consent from the Graduate Committee, upon the recommendation by the student's advisor, may waive this last requirement; but in no case may there be more than 9 hours outside the mathematical sciences counted toward the Master's degree. All the courses on the Master's degree program must constitute a coherent whole and must be approved by the student's advisory committee.

Creative Component, Report, or Thesis

Each student must complete either a creative component, report, or thesis. Under any of these three options, a written document and a public presentation based on this individually directed project is required.

Other Requirements

The University Catalog contains detailed procedures applicable to all Master's degrees.

Departmental Requirements:

Master of Science (M.S.) in Mathematics

Mathematics Education

The Master of Science Degree in Mathematics Education requires that the student demonstrate knowledge in certain core areas.

Core Course Requirements

All candidates for the M.S. Degree in Mathematics Education must earn a grade of A or B in a prescribed 18 hours from the following list of core courses.

Basic Areas:

Nine (9) hours, three (3) hours from courses listed in each of the following areas;

1. **Analysis:** Math 4143 (Advanced Calculus)

2. **Algebra/Number Theory:** 3 hours from any of Math 4613 (Modern Algebra), Math 4713 (Number Theory), Math 5013 (Modern Algebra II), Math 5023 (Advanced Linear Algebra)

3. **Mathematics Education:** Math 6990 (Topics in Collegiate Mathematics Education)

Topical Areas:

Nine (9) hours from the following courses with (6) hours in one of these areas and three (3) hours in another;

4. **Discrete Mathematics/Computer Science:** Math 4513 (Numerical Analysis), Math 4553 (Linear and Nonlinear Programming), Math 4663 (Combinatorial Math), Math 5543 (Numerical Analysis for Differential Equations), Math 5553 (Numerical Analysis for Linear Algebra), ComSci 4343 (Data Structures and Algorithm Analysis), ComSci 4793 (Artificial Intelligence), ComSci 5154 (Computer Science Migration).

5. **Geometry:** Math 4813 (Groups & Representations), Math 5413 (Differential Geometry), ComSci 4143 (Computer Graphics)

6. **Statistics:** Stat 4043 (Applied Regression Analysis), Stat 4113 (Probability Theory), Stat 4233 (Statistical Inference), Stat 5013 (Statistics for Experimenters I), Stat 5023 (Statistics for Experimenters II), Stat 5043 (Sample Survey Designs), Stat 5063 (Multivariate Methods), Stat 5303 (Experimental Design)

9/16/04

Note on prerequisites. It is assumed that students will have already completed the equivalent of Math 3613 (Introduction to Modern Algebra), Math 4023 (Introduction to Modern Analysis), Math 4403 (Geometry), and Stat 4013 (Statistical Methods I) thereby providing a sound foundation for graduate study. Courses taken as an undergraduate can be used to satisfy the above requirements, as long as they are consistent with the Graduate College requirements.

Courses outside the Mathematics Department other than those listed above must be approved by the student's advisory committee.

Courses Taken in Graduate School

The courses taken in graduate school must total at least 32 hours, which may include two hours credit for a Master's report. If a student elects to write a thesis, the minimum number of hours reduced to 30 of which, 6 are thesis credit. The courses taken on the Master's Degree program must include at least 21 hours of courses numbered 5000 or above of which 20 hours must be mathematics, statistics, or computer science courses. (Math 4143, 4153, and 4613 are considered 5000 level courses for this purpose.) No more than six hours outside the mathematical sciences will count towards the Master's Degree. All the courses on the Master's degree program must constitute a coherent whole and must be approved by the student's advisory council.

Creative Component, Report, or Thesis

Each student must complete a creative component, a report, or a thesis. Under any of these three options, a written document and a public presentation based on this individually directed project is required.

Teaching Experience

Any student in this program who is also a Teaching Assistant in the Department of Mathematics is encouraged to work with the Associate Head in designing a broad spectrum of teaching assignments.

Other Requirements

The University Catalog contains detailed procedures applicable to all Master's degrees.

Departmental Requirements (Pure Mathematics)
Doctor of Philosophy (Ph.D.) in Mathematics

Pure Mathematics: The Ph.D. degree in Pure Mathematics is designed to prepare a student for a career in university and industrial research and college instruction. Recipients of the Ph.D. degree in Pure Mathematics are expected to have significant breadth across the core areas of mathematics as well as skills to undertake independent and original research in a particular area. More information is available in the Guide to Graduate Study and the Graduate Program Handbook.

Credit requirements: A total of 90 hours above the B.S. degree or 60 hours above the M.S. is required, including 15-24 credit hours for the Ph.D. thesis.

Core requirements: All candidates for the Ph.D. in Pure Mathematics are required to complete 24 credit hours of core courses from the following list. A minimum GPA of 3.0 must be maintained in core courses.

1. Real Analysis I (Math 5143) and Real Analysis II (Math 5153)
2. Complex Analysis I (Math 5283) and Complex Analysis II (Math 5293)
3. Algebra I (Math 5613) and Algebra II (Math 5623)
4. Six hours from General Topology (Math 5303), Geometric Topology (Math 5313) or Algebraic Topology I (Math 6323)

Additional Courses: In addition to the core requirements, every plan of study must contain at least 12 hours of graduate courses in the Mathematical Sciences chosen from outside the major field of study.

Comprehensive Exams: A Ph.D. student in Pure Mathematics must select three (3) of the areas from the core requirements, listed above, and for each must pass a comprehensive exam covering the content of the core courses taken in that area. The exams in Mathematics are given twice a year, in August and January. The comprehensive exams must commence within one year of residence after completing the required coursework. All exams must be completed within 25 months after the first exam is taken. A student may sit for an exam a maximum of three times. With the approval of the student's advisor, a student may substitute the writing of a paper, called a Minor Thesis, for one of the comprehensive exams (see below regarding the requirements for a Minor Thesis).

Minor Thesis: The minor thesis option must be approved by the student's advisor and after the student has successfully passed two written comprehensive exams. The minor

thesis must be a creative, written work of research or exposition on a topic of mathematical content that is:

- In an area different from an area in which the student has passed a written comprehensive exam.
- On a topic that is not covered completely in any prior coursework.
- On a topic approved by the student's Advisory Committee.
- Completed in one semester (fall, spring, or summer), from start to finish, (to encourage the ability to learn mathematics independently and write a suitable exposition in a timely manner). No extensions will be granted.

After completion of the written Minor Thesis, the student must pass an oral exam on the subject of the minor thesis, which is administered by three faculty members approved by the Advisory Committee. A grade of pass or fail on the Minor Thesis will be assigned following this examination. A public presentation is encouraged but is not required. The Minor Thesis must be completed within the same 25 month period determined by the taking of the first comprehensive exam. A student who takes the Minor Thesis option and does not pass has no further option of a Minor Thesis.

Language Requirements: Candidates for the Ph.D. in Pure Mathematics must pass an examination demonstrating reading knowledge of one foreign language, usually French, German, or Russian, before they take the Qualifying Examination. Other languages may be substituted subject to recommendation of the student's committee and approval of the Graduate Committee, including a working ability with a computer language or symbolic computation meeting the satisfaction of the student's committee.

Qualifying Exam: The student must pass an oral qualifying examination over the area of specialization for the Ph.D. thesis. This exam covers material on a reading list presented to the student by the advisory committee. Its purpose is to test the student's readiness to begin thesis work.

Thesis Proposal: An outline of the proposed thesis research must be presented to the student's advisory committee for approval. A written proposal is then filed with the Graduate College.

Thesis: A thesis must be written according to Graduate College guidelines. The thesis consists of an original research contribution in pure or applied mathematics. It must be prepared according to the style required of doctoral theses and defended.

Graduate College Requirements: All requirements listed in the University catalog must be satisfied.

Departmental Requirements (Applied Mathematics)
Doctor of Philosophy (Ph.D.) in Mathematics

Applied Mathematics. The Ph.D. degree with emphasis in applied mathematics is intended to prepare a student for a variety of careers in industry, in government research laboratories and in university research and teaching. Application of mathematics is an important skill to be cultivated by students based on an ability to discern occurrences of mathematical structures in the human environment. More information is available in the Guide to Graduate Study and the Graduate Program Handbook.

Credit requirements: A total of 90 hours above the B.S. degree or 60 hours above the M.S. is required, including 15-24 credit hours for the Ph.D. thesis.

Core requirements: All candidates for the Ph.D. in Applied Mathematics are required to complete 24 credit hours of core courses. These must include 3 of the following 4 options (presumably the 3 options over which the student will take the Comprehensive Exams) plus an additional 6 credit hours from other courses in the approved electives given below. A minimum GPA of 3.0 must be maintained in core courses taken from Options 1 and 2. In all other courses, which are to satisfy the core course requirements, a student must have a grade of A or B. If the Minor Thesis option is elected, students should complete 2 of the following 4 options plus an additional 12 credit hours from other courses in the approved electives given below.

1. Real Analysis I (Math 5143) and Real Analysis II (Math 5153)
2. Complex Analysis I (Math 5283) and Complex Analysis II (Math 5293)
3. Numerical Analysis for Differential Equations (Math 5543) and Numerical Analysis for Linear Algebra (Math 5553)
4. Six hours from Fourier Analysis (Math 5213), Partial Differential Equations (Math 5233), or Ordinary Differential Equations I (Math 5243)

Electives: Any of the courses in the above 4 options, Math 5303, Math 5613, Math 5623, Math 5113, Math 5133, Math 5523, Math 5580, Math 5593.

Additional Courses: In addition to the core requirements, every plan of study must contain at least 12 hours of graduate courses in the Mathematical Sciences chosen from outside the major field of study.

Comprehensive Exams: A Ph.D. student in Applied Mathematics must select three (3) of the four areas from the core requirements, listed above, and for each must pass a comprehensive exam covering the content of the core courses taken in that area. The exams in Mathematics are given twice a year, in August and January. The comprehensive exams must commence within one year of residence after completing the required coursework. All exams must be completed within 25 months after the first exam

is taken. A student may sit for an exam a maximum of three times. With the approval of the student's advisor, a student may substitute the writing of a paper, called a Minor Thesis, for one of the comprehensive exams (see below regarding the requirements for a Minor Thesis).

Minor Thesis: The minor thesis option must be approved by the student's advisory committee and after the student has successfully passed two written comprehensive exams. The minor thesis must be a creative, written work of research or exposition on a topic of mathematical content that is:

- In an area different from an area in which the student has passed a written comprehensive exam.
- On a topic that is not covered completely in any prior coursework.
- On a topic approved by the student's Advisory Committee.
- Completed in one semester (fall, spring, or summer), from start to finish, (to encourage the ability to learn mathematics independently and write a suitable exposition in a timely manner). No extensions will be granted.

After completion of the written Minor Thesis, the student must pass an oral exam on the subject of the minor thesis, which is administered by three faculty members approved by the Advisory Committee. A grade of pass or fail on the Minor Thesis will be assigned following this examination. A public presentation is encouraged but is not required. The Minor Thesis must be completed within the same 25 month period determined by the taking of the first comprehensive exam. A student who takes the Minor Thesis option and does not pass has no further option of a Minor Thesis.

Language Requirements: The student's Advisory Committee must be satisfied that the student has a strong working ability with a computer language or symbolic computation.

Qualifying Exam: The student must pass an oral qualifying examination over the area of specialization for the Ph.D. thesis. This exam covers material on a reading list presented to the student by the advisory committee. Its purpose is to test the student's readiness to begin thesis work.

Thesis Proposal: An outline of the proposed thesis research must be presented to the student's advisory committee for approval. A written proposal is then filed with the Graduate College.

Thesis: A thesis must be written according to Graduate College guidelines. The thesis consists of an original research contribution in applied mathematics. It must be prepared according to the style required of doctoral theses and defended.

Graduate College Requirements: All requirements listed in the University catalog must be satisfied.

Departmental Requirements
Doctor of Philosophy (Ph.D.) in Mathematics

Specialization in Mathematics Education: The Ph.D. degree with Specialization in Mathematics Education is designed to prepare a student for a career where instruction in mathematics and research in mathematics education are of primary importance and is especially intended for students with an interest in college teaching of mathematics. More information is available in the Guide to Graduate Study and the Graduate Program Handbook.

Credit requirements: A total of 90 hours above the B.S. degree or 60 hours above the M.S. is required, including 15-24 credit hours for the Ph.D. thesis.

Core requirements: All candidates for the Ph.D. with Specialization in Mathematics Education are required to complete 24 credit hours of core courses. These must include 3 of the following 7 options plus an additional 6 credit hours from other courses on this list. A minimum GPA of 3.0 must be maintained in core courses. If the Minor Thesis option is elected, students should complete 2 of the following 7 options plus an additional 12 credit hours from other courses on this list.

1. Real Analysis I (Math 5143) and Real Analysis II (Math 5153)
2. Complex Analysis I (Math 5283) and Complex Analysis II (Math 5293)
3. Algebra I (Math 5613) and Algebra II (Math 5623)
4. Six hours from General Topology (Math 5303), Geometric Topology (Math 5313) or Algebraic Topology I (Math 6323)
5. Numerical Analysis for Differential Equations (Math 5543) and Numerical Analysis for Linear Algebra (Math 5553)
6. Six hours from Fourier Analysis (Math 5213), Partial Differential Equations (Math 5233), or Ordinary Differential Equations I (Math 5243)
7. Probability Theory (Stat 5113 – formerly 4113) and Statistical Inference (Stat 5223 – formerly 4223)

Additional Courses: In addition to the core requirements, every plan of study must contain at least 12 hours of graduate courses in Mathematical Sciences chosen from several areas of study.

Comprehensive Exams: A Ph.D. student in Mathematics Education must select three (3) of the areas from the core requirements, listed above, and for each must pass a comprehensive exam covering the content of the core courses taken in that area. The exams in Mathematics are given twice a year, in August and January. A student who elects to take the exam over the Statistics sequence will notify the Statistics Department and will take it when the Statistics Department offers their exams, which may not coincide with when the Mathematics exams are given. The comprehensive exams must commence within one year of residence after completing the required coursework. All

exams must be completed within 25 months after the first exam is taken. A student may sit for an exam a maximum of three times. With the approval of the student's advisor, a student may substitute the writing of a paper, called a Minor Thesis, for one of the comprehensive exams (see below regarding the requirements for a Minor Thesis).

Minor Thesis: The minor thesis option must be approved by the student's advisor and after the student has successfully passed two written comprehensive exams. The minor thesis must be a creative, written work of research or exposition on a topic of mathematical content that is:

- In an area different from an area in which the student has passed a written comprehensive exam.
- On a topic that is not covered completely in any prior coursework.
- On a topic approved by the student's Advisory Committee.
- Completed in one semester (fall, spring, or summer), from start to finish, (to encourage the ability to learn mathematics independently and write a suitable exposition in a timely manner). No extensions will be granted.

After completion of the written Minor Thesis, the student must pass an oral exam on the subject of the minor thesis, which is administered by three faculty members approved by the Advisory Committee. A grade of pass or fail on the Minor Thesis will be assigned following this examination. A public presentation is encouraged but is not required. The Minor Thesis must be completed within the same 25 month period determined by the taking of the first comprehensive exam. A student who takes the Minor Thesis option and does not pass has no further option of a Minor Thesis.

Language Requirements: There is no foreign language requirement; however, it is expected that students in the Specialization in Mathematics Education exhibit a strong working ability of calculator and computer assisted instruction, which is then documented in their Professional Development Portfolio (see below).

Professional Development Portfolio: Students in the Mathematics Education option must prepare a Professional Development Portfolio documenting professional activities in mathematics and mathematics education undertaken while a graduate student. This portfolio should contain a record of actual activities completed, for future inclusion on the student's curriculum vitae. Required components of the Professional Development Plan include active participation in the Mathematics Education seminar; attending and presenting at other workshops and conferences; attaining broad teaching experience in courses at different levels and with different modes of instruction, including the use of technology; documenting teaching quality with course syllabi and exams given, course evaluations, and letters of recommendation; and participating in a curriculum development project.

Curriculum Development Project: Every Mathematics Education candidate must participate in a curriculum development project under the supervision of a member of the faculty. A proposal for the curriculum development project should be developed within 6

months of passing the comprehensive exams and must be approved by the student's advisory committee.

Qualifying Exam: The student must pass an oral qualifying examination over the area of specialization for the Ph.D. thesis. This exam covers material on a reading list presented to the student by the advisory committee. Its purpose is to test the student's readiness to begin thesis work.

Thesis Proposal: An outline of the proposed thesis research must be presented to the student's advisory committee for approval. A written proposal is then filed with the Graduate College.

Thesis: A thesis must be written according to Graduate College guidelines. The thesis consists of an original research contribution in mathematics education. It must be prepared according to the style required of doctoral theses and defended.

Graduate College Requirements: All requirements listed in the University catalog must be satisfied.

Two-Year Planning Guide
for students transferring from
TULSA COMMUNITY COLLEGE to OKLAHOMA STATE UNIVERSITY
pursuing a Bachelor of Science degree in
MATHEMATICS

General Education Requirements		
OSU General Education Area	Hours	Tulsa Community College Equivalents
English Composition	6	ENG 1113 Freshman Composition I and ENG 1213 Freshman Composition II
American History and Government	6	HIS 1483 American History 1492 to 1865 or HIS 1493 American History 1865 to Present; and POS 1113 American Federal Government
Analytical and Quantitative Thought (A)	7	MTH 2124 Analytical Geometry and Calculus II and CSC 2303 PASCAL
Humanities (H)	6	6 hours designated (H) from list on back of sheet.
Natural Sciences and Scientific Investigation (N) (L)	8	PHY 1114 and 1214 General Physics I and II; or PHY 2034 and 2124 Engineering Physics I and II
Social and Behavioral Sciences (S)	6	6 hours designated (S) from list on back of sheet.
International Dimension (I)	0-3	(I) designated course from back of sheet.
Controlled Electives	1	Any course from list on back of sheet.

College/Departmental Requirements		
College/Department Courses	Hours	Tulsa Community College Equivalents
Arts and Humanities	3	*(see note 1 on back of sheet)*
Natural and Mathematical Sciences	9	*(see note 2 on back of sheet)*

Major Requirements
Minimum grade "C" MTH 2134 Analytic Geometry and Calculus III MTH 2613 Elementary Differential Equations

8 Elective hours

Total TCC Hours: Maximum 67

__Foreign Language Proficiency:__ Two years one language in high school or 10 hours one college level language. *(must complete 1413)*

A minimum of 60 hours must be earned at a four-year institution, and a minimum of 30 hours must be earned in residence at Oklahoma State University.

This sheet is to be used only as a guide and should not be considered a contract between the student and either Oklahoma State University or the College of Arts & Sciences.

Additional requirements to earn the BS Degree in Mathematics at Oklahoma State University include:

Minimum grade of "C" in each course

MATH 3013; 3613; 4023

12 hours from:
   MATH 3653, 4013, 4143, 4153, 4233, 4283, 4403, 4513, 4553, 4583, 4613, 4663, 4713, 5013,
   5023, 5303, 5593

6 hours from:
   Mathematics or Statistics courses numbered 4000 or above or from upper-division courses in
   Computer Science or Physics

6 hours from:
   Upper-division courses in any field

Electives (*17 hours may need to be upper division*)   27 hours

Total Credit Hours: 60

These courses must include 6 hours of upper division General Education designated courses outside of the major prefix.

A maximum of 48 hours may be earned in any one prefix.

* *

Analytical and Quantitative Thought (A)
CSC	2303
MTH	1473, 1513, 1613, 1715, 2124, 2134, 2193, 2523
PHI	2113

Humanities (H)
ART	1053
ENG	2413, 2543, 2653, 2673, 2683, 2773, 2883
HIS	1053, 1063, 1083, 1093, 2013, 2023
HUM	2113, 2223
MUS	1113
PHI	1113, 2133
THE	2113

*Also international dimension (I)

Social Sciences (S)
ECO	2013
GEO	1043*, 2033*
POS	2023, 2053
PSY	1113, 2023
SOC	1113, 2013, 2043, 2053
SPE	1113

Natural Sciences (N) and Scientific Investigation (L)
BIO	1114, 2164
CHE	1034, 1315, 1415
GEO	1014
GEL	1014, 1024
PHY	1114, 1214, 2034, 2124

The above listing includes only those Tulsa Community College courses that have been evaluated as exact equivalents to courses in the Oklahoma State University general education program. For additional acceptable choices, discuss options with an Oklahoma State University or Tulsa Community College adviser.

* *

1. *The Arts are defined as any course carrying an (H) designation and courses from art, music, creative writing, theater, foreign languages (2000 level and above) and literature.*

2. *Natural and Mathematical Sciences are defined as any course in the natural sciences such as astronomy, biochemistry, biology, botany, chemistry, geology, mathematics, microbiology, physics, statistics and zoology, and courses from other departments that carry an (A) or (N) general education designation.*

3. *Total hours must include 50 hours in courses numbered 3000 or above.*

Two-Year Planning Guide
for students transferring from

TULSA COMMUNITY COLLEGE to OKLAHOMA STATE UNIVERSITY
pursuing a Bachelor of Arts degree in
MATHEMATICS

General Education Requirements

OSU General Education Area	Hours	Tulsa Community College Equivalents
English Composition	6	ENG 1113 Freshman Composition I and ENG 1213 Freshman Composition II
American History and Government	6	HIS 1483 American History 1492 to 1865 or HIS 1493 American History 1865 to Present; and POS 1113 American Federal Government
Analytical and Quantitative Thought (A)	7	MTH 2124 Analytical Geometry and Calculus II and CSC 2303 PASCAL
Humanities (H)	6	6 hours designated (H) from list on back of sheet.
Natural Sciences and Scientific Investigation (N) (L)	8	PHY 1114 or 2034 General Physics I and PHY 1214 or 2124 General Physics II
Social and Behavioral Sciences (S)	6	6 hours designated (S) from list on back of sheet.
International Dimension (I)	0-3	(I) designated course from back of sheet.
Controlled Electives	1	Any course from list on back of sheet.

College/Departmental Requirements

College/Department Courses	Hours	Tulsa Community College Equivalents
Arts and Humanities	9	(see note 1 on back of sheet)
Natural and Mathematical Sciences	3	(see note 2 on back of sheet)
Foreign Languages	3-12	Choose one language from CHI, FRE, GER, JAP, RUS, SPA. (must complete 1413)

Major Requirements

Minimum grade "C"

MTH 2134 Analytic Geometry and Calculus III
MTH 2613 Differential Equations

Total TCC Hours: Maximum 67

A minimum of 60 hours must be earned at a four-year institution, and a minimum of 30 hours must be earned in residence at Oklahoma State University.

This sheet is to be used only as a guide and should not be considered a contract between the student and either Oklahoma State University or the College of Arts & Sciences.

Additional requirements to earn the BA Degree in Mathematics at Oklahoma State University include:

Remaining hours from front of sheet.

Minimum grade of "C" in each course

MATH 3013; 3613; 4023

<u>12 hours from:</u>
MATH 3653; 4013; 4143; 4153; 4233; 4283; 4403; 4513; 4553; 4583; 4613; 4663; 4713; 5013; 5023; 5303; 5593

<u>6 hours from:</u>
Mathematics or Statistics courses numbered 4000 or above or from upper-division courses in Computer Science or Physics

<u>6 hours from:</u>
Upper-division courses in any field

Electives (*17 hours may need to be upper division*)   23 hours

Total Credit Hours: 60

These courses must include one course in Non-Western Studies, and 6 hours of upper division General Education designated courses outside of the major prefix.

A maximum of 48 hours may be earned in any one prefix.

* *

Analytical and Quantitative Thought (A)
CSC   2303
MTH   1473, 1513, 1613, 1715, 2124, 2134, 2193, 2523
PHI   2113

Humanities (H)
ART   1053
ENG   2413, 2543, 2653, 2673, 2683, 2773, 2883
HIS   1053, 1063, 1083, 1093, 2013, 2023
HUM   2113, 2223
MUS   1113
PHI   1113, 2133
THE   2113

*Also international dimension (I)

Social Sciences (S)
ECO   2013
GEO   1043*, 2033*
POS   2023, 2053
PSY   1113, 2023
SOC   1113, 2013, 2043, 2053
SPE   1113

Natural Sciences (N) and Scientific Investigation (L)
BIO   1114, 2164
CHE   1034, 1315, 1415
GEO   1014
GEL   1014, 1024
PHY   1114, 1214, 2034, 2124

The above listing includes only those Tulsa Community College courses that have been evaluated as exact equivalents to courses in the Oklahoma State University general education program. For additional acceptable choices, discuss options with an Oklahoma State University or Tulsa Community College adviser.

* *

1. The <u>Arts</u> are defined as any course carrying an (H) designation and courses from art, music, creative writing, theater, foreign languages (2000 level and above) and literature.

2. <u>Natural and Mathematical Sciences</u> are defined as any course in the natural sciences such as astronomy, biochemistry, biology, botany, chemistry, geology, mathematics, microbiology, physics, statistics and zoology, and courses from other departments that carry an (A) or (N) general education designation.

3. Total hours must include 50 hours in courses numbered 3000 or above.

CRITERION III

Program Resources

A. New facilities and major equipment There have been no major changes in facilities and no major equipment added in the past five years.

B. Academic and administrative efficiencies 1. In general, we have increased class sizes to accommodate student enrollment without adding additional sections, which would require hiring additional instructors.
2. In two courses (Math 1493: Applications of Modern Mathematics and Math 2103: Elementary Calculus) we switched to very large sections (up to 250 students) taught by an instructor assisted by teaching assistants. Previously, these courses were taught in sections of 35 to 45 students with an instructor in each section. We also monitor enrollment as the start of each semester approaches and cancel sections with small enrollment.
3. Previously, we gave a faculty member release time from teaching to assist with the operation of the Mathematics Learning Resource Center and provide assistance to the tutors working there. This position has now been eliminated.

C. External funding External funding in the Department of Mathematics is down by approximately 20% according to the Five-Year Academic Report Card. We believe the majority of this decrease is due to the department's loss of so many senior faculty over the last five years (described elsewhere in this report). Most of these senior faculty held grants from either the National Science Foundation or the National Security Agency. Currently, our tenure-track faculty is about 15% below its authorized strength. We are conducting a national search this year to fill four vacant faculty positions. One other vacant faculty position was eliminated by the budget cuts two years ago and has not been restored.

CRITERION IV
Productivity

A. Number of majors, student credit hours, and average time to graduation The number of undergraduates in mathematics has decreased over the last five years while the number of graduate students in mathematics has increased. The data probably understates the number of undergraduate mathematics majors. Double majors, one of whose majors is mathematics, are often not counted in these statistics. In particular, there are a number of math education majors who are double majors in math education and mathematics.

The number of student credit hours during fall semester has fallen by about 10% over the last two years. We are not sure of all the reasons for that. Math 0123 was moved from OSU to NOC two years ago, which was a shift of about 1,000 student credit hours during the fall semester. We have also made some curricular changes which may have affected fall enrollment. The regular calculus was changed from a two-semester sequence to a three-semester sequence so perhaps more students take one semester of calculus during the summer. We now teach elementary calculus (Math 2103) in very large sections during the fall semester. It may be that more students will take it in the spring, when we teach it in our traditional smaller section format. And it is now possible for OSU students to take some of their general education math courses at NOC-Stillwater.

Average time to graduation seems to remain about the same for undergraduates, four and a half years.

B. Faculty ratio and class size Over the last five years, the number of classes taught has decreased and the average class size has increased. Probably most of the decrease in the number of classes taught is due to moving Math 0123 from OSU to NOC. A smaller portion of the decrease, and the resulting increase in average class size, is due to our close monitoring of enrollment. We have been canceling small sections of multi-section courses when the remaining sections had enough room to absorb the students from the canceled sections. Also contributing to the increase in class size is our shift to very large sections of Math 1493 and Math 2103 during fall semesters, replacing our previous smaller section format.

We will continue to try to manage our courses in an efficient manner. This means monitoring enrollment to identify and cancel unusually small sections of multi-section courses and experimenting with the use of very large section courses when we feel the quality of instruction will not be compromised.

C. 5-year average number of degrees conferred and majors The Department of Mathematics offers four degrees: BA, BS, MS, and Ph. D. in mathematics. Our 5-year average number of degrees conferred is 1.2 for the BA, 14.6 for the BS, 6.4 for the MS, and .8 for the Ph. D. Our 5-year average headcount is 4.6 for the BA, 45.8 for the BS, 19.2 for the MS, and 19.4 for the Ph. D. Thus we are below the Regents' minimum productivity standards for the BA degree in both headcount and number of degrees conferred and for the Ph. D. degree in number of degrees conferred.

We do not have a plan to try to increase productivity in the BA program. The difference between the BA and BS programs is that the BA program requires more credits in the arts and humanities and fewer credits in statistics, computer science, and the natural sciences; both take the same math courses. Also, the BA degree requires 10 hours of foreign language study. Since most math majors are more interested in the natural and mathematical sciences than in arts and humanities, most opt for the BS degree. The BA fills a useful niche for certain students, for example, students interested in a foreign language and economics with an eye on a career in financial analysis of foreign markets. There is no extra cost in providing this option, so we recommend the BA continue to be offered.

We are actively working to increase the number of Ph. D. degrees we confer. The Ph. D. program has an adequate headcount, the problem is that students are taking a long time to complete the degree or are dropping out of the program before degree completion. We have taken a number of steps to deal with these difficulties. First of all, we have streamlined the program somewhat, reducing the number of exams students must pass before beginning work on the dissertation. We hope that this will help students get through the program quicker by focusing sooner on their research project, which is the most time-consuming task they face. Some students fail to finish at all, usually because they are unable to pass the comprehensive exams. We are actively trying to recruit better students who are more likely to be able to complete the Ph. D. program. Part of the difficulty is that most Ph. D. students in mathematics support themselves through teaching assistantships, and our teaching assistantships are among the least generous in the country. Our teaching assistants receive smaller stipends and do more teaching than in other math departments. This makes it hard for us to recruit the better graduate students. We are currently trying to devise ways to reduce our teaching assistants' workloads and are working with others at OSU to increase their financial support.

The changes we have made are already producing some improvement. We now have six students who have passed their comprehensive exams and are working on their dissertations. We expect to award two or three Ph. D. degrees this summer and maintain a comparable output in the future. We think a goal of two Ph. D. degrees per year is reasonable under the current budget scenario.

The graduate teaching assistants in the Ph. D. program are crucial to the Math Department's instructional mission. They teach some of the more advanced 2000-level courses, like the engineering calculus sequence. One TA who is in the process of completing his dissertation research teaches all our courses at OSU-Tulsa. There aren't enough qualified people in the Stillwater area to fill the gap that would be created by eliminating these teaching assistants, and I don't know how we would cope with their loss. Although by any standard we have a small Ph. D. program, the students in that program perform a vital function for the Math Department.

Oklahoma State University
FIVE-YEAR ACADEMIC REPORT CARD
MATHEMATICS

Fall Semester	2000	2001	2002	2003	2004	Change Amount	Change Percent
Student Information							
Headcount							
Undergraduate	60	56	50	44	42	-18	-30.0%
Graduate	37	32	38	39	47	10	27.0%
Professional	0	0	0	0	0	0	
Total	97	88	88	83	89	-8	-8.2%
Minority	28	25	21	23	39	11	39.3%
Non-minority	69	63	67	60	50	-19	-27.5%
Entry Information							
ACT Average							
ACT 25th - 75th Percentile	-	-	-	-	-		
Top 10% High Sch. Class(%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Retention/Graduation Rates							
No. of Full-time Semesters	0	8.7	8.7	8.6	9.1	0.4	4.6%
Semester Credit Hours - State Funded							
Undergraduate	18,237	18,291	18,352	17,225	16,217	-2,020	-11.1%
Graduate	181	132	157	205	219	38	21.0%
Professional	0	0	0	0	0	0	-
Total	18,418	18,423	18,509	17,430	16,436	-1,982	-10.8%

Number of Lecture Classes Taught .Avg Class Size	Number	Avg.	Number	Avg.	Number	Avg.	Number	Avg.	Number	Avg.	Change Amount	Change Percent
Undergraduate	121	44.4	121	44.0	118	46.9	118	44.9	95	52.6	-26	-21.5%
Graduate/Professional	4	8.0	4	7.0	4	9.0	6	8.0	6	10.0	2	50.0%
All Student	125	43.2	125	42.8	122	45.7	124	43.1	101	50.1	-24	-19.2%

	2000	2001	2002	2003	2004	Change Amount	Change Percent
Class Size							
% of Classes < 20	12.0%	12.0%	10.7%	17.7%	12.9%	0.9%	
% of Classes > 50	12.8%	15.2%	15.6%	12.1%	17.8%	5.0%	
OSU-Tulsa							
Headcount	2	2	2	1	2	0	0.0%
Student Credit Hours	0	117	126	114	81	81	-
Faculty Information							
Instructional-FTE							
Professor-Lecturer	39.15	40.22	39.88	33.53	33.60	-5.55	-14.2%
Graduate Assistant	19.04	18.66	17.06	19.02	21.82	2.78	14.6%
Total	58.19	58.88	56.94	52.55	55.42	-2.77	-4.8%
Headcount							
Professor-Lecturer							
Total	48	53	51	45	41	-7	-14.6%
Minority	7	6	10	10	11	4	57.1%
Tenured/Tenure Track	25	26	26	28	26	1	4.0%
Tenured	23	22	21	23	22	-1	-4.3%
%Tenured	92.0%	84.6%	80.8%	82.1%	84.6%	-7.4%	
% of Faculty Full - Time	92.7%	88.8%	89.8%	86.9%	91.4%	-1.3%	57.1%
Student Faculty Ratio	1.8	1.7	1.7	1.8	1.9	0.1	6.4%

Faculty Salaries vs. Peer Inst. (Full-time Faculty - 9 mos.)	OSU	Big 12	OSU	Big 12	OSU	Big 12	OSU	Big 12	OSU	Big 12	OSU Change Amount	OSU Change Percent
Professor	$71,666	$79,936	$73,667	$83,985	$72,487	$85,473	$77,119	$87,435	$79,523		$7,857	11.0%
Associate	$51,294	$56,210	$51,276	$58,988	$56,032	$61,035	$54,885	$61,397	$59,292		$7,998	15.6%
Assistant	$47,028	$49,566	$52,128	$51,922	$52,303	$52,567	$53,707	$52,915	$56,500		$9,472	20.1%

Classes Taught by Tenured/Tenure Track	2000	2001	2002	2003	2004	Change	
% Lower Div. Classes	21%	15%	20%	30%	27%	6.00%	
% Undergrad. Classes	31%	27%	30%	41%	39%	8.00%	

Oklahoma State University
FIVE-YEAR ACADEMIC REPORT CARD
MATHEMATICS

Fiscal Year	2000	2001	2002	2003	2004	Change Amount	Change Percent
Financial Information							
Faculty Salaries	$2,389,891	$2,523,155	$2,543,231	$2,570,603	$2,558,383	$168,492	7.1%
Other Salaries	$225,976	$257,520	$276,019	$239,645	$219,636	($6,340)	-2.8%
Fringe Benefits	$427,137	$580,865	$613,698	$636,277	$617,131	$189,994	44.5%
Travel	$17,946	$11,271	$14,586	$18,327	$13,675	($4,271)	-23.8%
Utilities	$0	$0	$0	$60	$0	$0	-
Supplies Other Oper. Exp.	$64,322	$73,514	$75,592	$67,276	$56,429	($7,894)	-12.3%
Property, Furniture Equip.	$12,107	$16,087	$23,967	$8,948	$1,415	($10,692)	-88.3%
Library Books Periodicals	$433	$622	$356	$0	$2,657	$2,224	514.0%
Transfers Other Disbur.	$0	$0	$0	$0	$0	$0	-
Total	$3,137,812	$3,463,034	$3,547,449	$3,541,136	$3,469,325	$331,514	10.6%
Cost per SCH	$99.48	$105.32	$104.60	$106.31	$109.89	$10.41	10.5%
Cost per SCH in Constant $	$99.48	$102.32	$99.94	$99.05	$99.23	($0.25)	-0.3%
Other Revenue							
Other Student Fees	$0	$0	$0	$0	$0	$0	-
Gifts and Grants	$220,543	$200,956	$115,689	$109,947	$136,566	($83,977)	-38.1%
OSU-Tulsa Fac. Exp. Transfers	$0	$0	$0	$0	$0	$0	-
Fees Related to Educ. Depts.	$5,498	$0	$2	$0	$0	($5,498)	-100.0%
Other Income	$21,487	$55,765	$106,759	$73,278	$75,577	$54,090	251.7%
Total	$247,528	$256,721	$222,451	$183,226	$212,142	($35,385)	-14.3%
External Funding							
Sponsored Expenditures**	$560,285	$468,346	$502,225	$483,341	$453,077	($107,208)	-19.1%

**Excludes federal appropriations for College of Agriculture Sciences and Natural Resources.

OSHRE PROGRAM REVIEW
CRITERION IV - PROGRAM PRODUCTIVITY
FIVE YEAR HISTORY OF DEGREES AWARDED

------ COLLEGE=ARTS & SCIENCES, DEPARTMENT=MATHEMATICS ------

		YEAR				
		1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
		N	N	N	N	N
PROGRAM	TERM					
Mathematics - BA	FALL				1	
	SPRING	1	1	1		2
	All	1	1	2		2
Mathematics - BS	TERM					
	SUMMER			1	3	2	1
	FALL	6	6	4	3	2
	SPRING	5	7	13	7	13
	All	11	14	20	12	16
Mathematics - MS	TERM					
	SUMMER				4	4	6
	FALL			3	5	
	SPRING	1	3	3	2	1
	All	1	6	12	6	7
Mathematics - PHD	TERM					
	SUMMER	1	1		1	
	FALL				1	
	All	1	1		2	

-- DEPARTMENT_NAME=MATHEMATICS --

	FALL
	FALL	FALL	FALL	FALL	FALL
	2000	2001	2002	2003	2004
	N	N	N	N	N
PROGRAM					
Mathematics - BA	7	3	5	5	3
Mathematics - BS	53	53	45	39	39
Mathematics - MS	20	16	18	19	23
Mathematics - PHD	17	16	20	20	24

CRITERION V
Quality

A. Program faculty qualifications

Name	Faculty Status	Faculty FTE	Degrees Earned		Related Work Experience
			Highest Type	Highest in Teaching Area Type	
Adolphson, Alan	regular		Ph. D.		
Aichele, Douglas	regular		Ph. D.		
Alspach, Dale	regular		Ph. D.		
Barchini, Leticia	regular		Ph. D.		
Beasley, Krista	adjunct		M. S.		
Bertholf, Dennis	regular		Ph. D.		
Bible, Howard	adjunct		M. S.		
Binegar, Birne	regular		Ph. D.		
Binegar, Yumi	adjunct		B. S.		
Bowen, James	adjunct		Ed. D.		
Burchard, Hermann	regular		Ph. D.		
Choike, James	regular		Ph. D.		
Crauder, Bruce	regular		Ph. D.		
Dearinger, Kathy	adjunct		M. S.		
Evans, Benny	regular		Ph. D.		
Gann, Ken	adjunct		M. S.		
Ghosh, Amit	regular		Ph. D.		
Grinshpan, Anatoly	regular		Ph. D.		
Gunther, Gerri	adjunct		M. S.		
Henneke, Matthew	adjunct		M. S.		
Jaco, William	regular		Ph. D.		
Ju, Ning	regular		Ph. D.		
Kable, Anthony	regular		Ph. D.		
Keener, Marvin	regular		Ph. D.		
Kipolla, T.	adjunct		M. S.		
Li, Tao	regular		Ph. D.		
Li, Weiping	regular		Ph. D.		
Mantini, Lisa	regular		Ph. D.		
Mavlyutov, Anvar	regular		Ph. D.		

| Name | Faculty Status | Faculty FTE | Degrees Earned | | Related Work Experience |
| | | | Highest | Highest in Teaching Area | |
			Type	Type	
Miller, David	adjunct		M. S.		
Morris, Tracy	adjunct		M. S.		
Myers, John	regular		Ph. D.		
Noell, Alan	regular		Ph. D.		
Perk, Helen	adjunct		Ph. D.		
Petty, Gerri	adjunct		B. S.		
Pritsker, Igor	regular		Ph. D.		
Przeworski, Andrew	regular		Ph. D.		
Silver, Rosetta	adjunct		B. S.		
Stadler, Barb	adjunct		M. Ed.		
Thomas, Mark	adjunct		M. S.		
Tipps, Alan	adjunct		M. S.		
Ullrich, David	regular		Ph. D.		
Wang, Qingxue	regular		Ph. D.		
Wolfe, John	regular		Ph. D.		
Wright, David	regular		Ph. D.		
Wu, Jiahong	regular		Ph. D.		
Zierau, Roger	regular		Ph. D.		

B. Evidence of regional/national reputation and ranking Members of our faculty receive research grant support from the National Science Foundation and the National Security Agency, they receive speaking invitations to conferences and to regional and national meetings of the American Mathematical Society and the Mathematical Association of America, and they serve on boards and committees of those organizations. A number of our faculty are winners of the Distinguished Teaching Award of the Oklahoma-Arkansas section of the Mathematical Association of America.

C. Scholarly activity See "External Funding" on the Five-Year Academic Report Card.

D. Assessment of student achievement of expected learning outcomes for each degree program (Notes: (1) The number of students assessed is greater than the number of bachelors degrees in mathmatics awarded. This is because we also assess students receiving bachelors degrees in mathematics education. (2) New assessment methods are being developed for the masters program. Changes in the masters program have rendered the previous assessment method obsolete. (3) Since we grant so few Ph. D. degrees, we assess all the Ph. D. students who attempt the comprehensive exams, not just actual graduates.)

B. S. and B. A. in Mathematics

Key Expected Outcome	Method used to assess this outcome	Years this assessment conducted	No. of grads/ number assessed
Knowledge of modern mathematics Able to reason and communicate Able to solve technical problems	Grades in core courses	2004	18/24
Satisfaction with preparation Suitably employed Career Success	Exit survey	2004	18/11

Ph. D. in Mathematics

Key Expected Outcome	Method used to assess this outcome	Years this assessment conducted	No. of grads/ number assessed
Broad knowledge of mathematics Able to reason and communicate Able to solve advanced problems	Results of comprehensive exams and minor theses	2004	1/10

E. Overview of results from program outcomes assessment For the BS and BA degrees: In the two core courses Math 3613 and Math 4023, math and math education graduates had 15 A's, 17 B's and 4 C's. Eight students received D's or F's and needed to repeat one or both of these courses. Overall, we feel that students are succeeding in these core courses. In the exit survey, students expressed overall satisfaction with their preparation and plans for the future. Generally, they cited the more advanced math courses they took, particularly the core courses Math 3613 and Math 4023, as providing the strongest preparation in reasoning ability, communication skills, and problem solving.

For the Ph. D. degree: We chose to assess the success of our Ph. D. program by the students' performance on comprehensive exams and minor theses. Our program produces very few Ph. D. graduates and the comprehensive exams seem to be a major stumbling block, so we are focusing our assessment efforts on students who take these exams, rather than restricting ourselves to graduates. Out of 9 exams administered there were 2 passes. Two students attempted minor theses and both passed. We feel the introduction of the minor thesis option has been a success and over time will increase the number of students who have completed their comprehensive exam requirements and have begun research on their dissertations.

F. Feedback from program alumni/documented achievements of program graduates Results from the 2004 OSU Undergraduate (B.S. and B.A) Program Alumni Survey of students who received their baccalaureate degree in 1998 or 2002: All but one reported that they were employed, the one unemployed graduate was not currently seeking employment. Three were currently enrolled in a graduate or professional school, none had completed their programs yet. Fifteen of the seventeen students who responded to the survey reported that they were very satisfied with the quality of instruction they had received and two of the seventeen reported that they were somewhat satisfied with the quality of instruction.

Results from the 2003 OSU Graduate (M.S. and Ph.D.) Program Alumni Survey of students who received their graduate degree in 1997 or 2001. Four reported that they were currently unemployed but only one of them was seeking employment. Five were currently enrolled in another graduate or professional school program and one had completed another program. Two of the nine who responded said they were very satisfied with their overall educational experience at OSU, six said they were satisfied, and one was neutral.

G. Other Program Evaluations There have been no outside reviews of our program within the last five years.

CRITERION VI
Program Demand/Need

A. Occupation Manpower Demand Not Applicable

B. Societal Needs for the Program Our society needs people trained in mathematics to work in business, industry, teaching, and governmental service. The modern world puts a premium on analytic thinking and technical problem solving. People who are well trained in mathematics have a distinct advantage over their competition.

Mathematics plays in important role in virtually every degree program on campus. We teach general education courses for all students, service courses for students in disciplines that make extensive use of mathematics, and more specialized courses for mathematics and mathematics education majors. Our faculty and graduate students discover, apply, and disseminate mathematical ideas and methods to support economic development and enhance the quality of life in the state and nation.

C. Graduate student applications and enrollment changes The numbers for our masters program have remained relatively constant over the last three years. There was a significant drop in international applications from 2003 to 2004. We believe this is due to a perception that it is more difficult now for foreign students to obtain visas for study in the United States. There was an increase in the number of acceptances and the number of enrolled students in 2004. We believe this is due to the fact that we shifted some soft money into the graduate program and offered more teaching assistantships that year. It is unclear whether we will have enough soft money in the future to continue to offer these extra teaching assistantships. The number of masters degrees granted fell sharply after 2002. We believe that 2002 was an aberration; six or seven masters degrees per year seems like a more reasonable rate of production for us.

As in the masters program, we were able to increase enrollment in the Ph. D. program in 2004 by providing additional teaching assistantships. The number of applications from domestic students to our Ph. D. program has steadily declined over the last three years, resulting in a corresponding decrease in the number of acceptances and new enrollments. This is probably due to the fact that our financial support for teaching assistants has become less and less competitive over the years when compared with other universities. This fact has had an effect on international students in the Ph. D. program as well. Although the numbers of applications and acceptances from international students has not declined, the number of new enrollments has remained a very small percentage of those numbers.

Our main concern is the small number of Ph. D. degrees being granted, and we have taken steps to increase their production. This is discussed under Criterion IV (Productivity) in Section C.

GRADUATE STUDENT APPLICATIONS AND ENROLLMENT CHANGES
2002 - 2004

AS MS MATH

	Enrolled			Applications			Acceptances			New Enrollments from Applications Accepted			Graduations (Summer, Fall, Spring totals shown)		
	2002	2003	2004	2002	2003	2004	2002	2003	2004	2002	2003	2004	2002	2003	2004
Domestic	14	14	14	7	13	14	8	10	12	6	6	7	7	6	3
		0	0		6	1		2	2		0	1		(1)	(3)
International	4	5	9	12	23	10	2	2	4	0	2	2	5	0	4
		1	4		11	(13)		0	2		2	0		(5)	4
Totals	18	19	23	19	36	24	10	12	16	6	8	9	12	6	7
		1	4		17	(12)		2	4		2	1		(6)	1

AS PHD MATH

	Enrolled			Applications			Acceptances			New Enrollments from Applications Accepted			Graduations (Summer, Fall, Spring totals shown)		
	2002	2003	2004	2002	2003	2004	2002	2003	2004	2002	2003	2004	2002	2003	2004
Domestic	13	12	11	12	9	3	12	10	4	8	5	3	0	0	0
		(1)	(1)		(3)	(6)		(2)	(6)		(3)	(2)		0	0
International	7	8	13	15	17	13	6	8	8	0	1	2	0	2	0
		1	5		2	(4)		2	0		1	1		2	(2)
Totals	20	20	24	27	26	16	18	18	12	8	6	5	0	2	0
		0	4		(1)	(10)		0	(6)		(2)	(1)		2	(2)

CRITERION VII
Program Duplication

A. Identify other degree programs at OSU with similar titles or functions The Department of Mathematics offers both a Bachelor of Science degree and a Bachelor of Arts degree in mathematics.

B. For similar programs, describe how each degree program fulfills unique student needs Students in both programs must meet the same requirements in mathematics but have different options for the other courses they take. The Bachelor of Science degree emphasizes the physical and mathematical sciences, e. g., physics, computer science, statistics. Most of our math majors have a strong interest in these related subjects and opt for the Bachelor of Science degree. We have a relatively small number of majors with a stronger interest in the arts and humanities or in foreign languages. The Bachelor of Arts degree is more appropriate for them. Students can pursue their interests in these areas and work towards a degree in mathematics at the same time. For example, this option is useful for students pursuing a double major in math and music, or math and a foreign language. Without the Bachelor of Arts degree, these sorts of students would take significantly longer to graduate or would have to curtail the pursuit one of their interests.

SUMMARY AND RECOMMENDATIONS

A. Strengths The chief strength of the Department of Mathematics is the quality and diversity of its faculty. We cover a broad area of modern mathematics, engage in research, publish our results, present our findings at meetings and conferences, and compete successfully for external funding. We offer quality instruction to both undergraduate and graduate students, providing suitable math courses for all students on campus who need mathematical training for their program of study and producing graduates who can contribute effectively to a modern technological society. These achievements have produced national and international recognition for our department.

B. Areas for Improvement

1. Retention of faculty: In the last five years we have lost nine tenure-track faculty; seven of the nine were senior faculty, most of whom had external funding. This is not a problem we can solve internally. We need more competitive salaries for faculty and greater funding for our graduate program so that we can attract graduate students capable of working on faculty-directed research projects.

2. Ph. D. program: We need more funding for our graduate program so that we can attract more quality students who are capable of completing the Ph. D. degree. We have modified our Ph. D. program to reduce time to graduation and to meet the regents productivity requirements, and we will make further adjustments as necessary to achieve those goals.

3. Undergraduate and graduate: We need to expand our course offerings into areas of increasing practical importance such as numerical computation, biomathematics, financial mathematics. Our society has a need for people trained in these fields and students are interested in pursuing these careers.

4. General education courses: Sections are getting larger and we are teaching more sections with adjunct faculty. For example, we teach College Algebra in sections of over 100 students (I don't know of any other college in the state that teaches it in sections larger than 40). Last fall we had over 30 sections of mostly gen ed courses taught by temporary lecturers.

5. MLRC: The Math Learning Resource Center provides tutoring help to students in lower-division math courses. It needs more faculty input and supervision, particularly now that we are increasing the use of technology in our courses, but we can't spare any faculty for this purpose and we can't afford to hire someone with the necessary expertise.

6. Maintenance: The maintenance budget hasn't increased in decades. We have to run our office by using money that should be spent on research and instruction.

7. Computing: All individual faculty have computers on their desks and the department has several servers, but we do not have funding for the tech support people who keep the system functioning and provide security. We have to pay their salaries out of money that could be used for research and instruction.

C. Recommendations for Action

1. **Increase support for graduate education** Most graduate students in mathematics support themselves through teaching assistantships. Our teaching assistant stipends are not competitive with other universities in the country. Having more graduate students would allow us to run courses more regularly (so students could complete their required coursework earlier) and run more advanced topics courses (to introduce students to research topics earlier). Having more teaching assistants would allow us to reduce the size of some of our classes and also reduce the number of adjunct faculty hired each semester.

2. **Add five new faculty positions** These positions should be in new areas of mathematics not covered by current faculty. These new faculty would allow us to offer a broader range of undergraduate courses and allow our graduate students a wider choice of areas in which to do research. They would also share some of the burden of departmental service, giving all faculty more time to devote to research and teaching.

3. **Increase the number of undergraduate majors** Broadening our undergraduate program by offering courses in new areas of applied mathematics will help to attract more math majors. It would also be very helpful to have more scholarship money to award to promising undergraduates.

4. **Increase the maintenance budget** The maintenance budget should include enough money to cover the overhead expenses of running a mathematics department in the twenty-first century. This would free up funds that should be going to support research and teaching.

5. **Permanent funding for postdocs** Our department benefits greatly by having a steady stream of young mathematicians working as temporary faculty for a few years after receiving their Ph. D. Their research introduces new ideas into the subject and they benefit by having senior faculty mentor their development as researchers and teachers. It is a strain for us to try to support post-docs on soft money, particularly with the budget problems of the last few years.

6. **Fund a second endowed chair in the math department** The Grayce B. Kerr Chair of Mathematics has been the most significant addition to our program in the last fifteen years. Besides attracting a world-class mathematician, the earnings support travel, visitors, and graduate students. A second such chair would greatly enhance our program.

D. Five-Year Goals for the Program

1. Reach an enrollment of 60 students in our graduate program

2. Meet the Regents' productivity requirements for the Ph. D. degree

3. Add five new faculty

4. Increase the amount of external funding faculty receive

5. Increase the number of undergraduate majors

6. Obtain permanent funding for post-doctoral positions

7. Obtain funding for a second endowed chair

8. Obtain more funding for undergraduate scholarships