Appendix A: Student and Faculty Statistical Summary

Department of Mathematics					
Student and Faculty Statistical Summary					
(data provided by Institutional Research)					
	2007-08	2008-09	2009-10	2010-11	2011-12
Student Credit Hours Total [1]	**42,566**	**36,572**	**40,533**	**44,008**	**45,971**
Mathmatics	16,029	16,526	16,797	18,621	17,828
Mathmatics Remedial	26,537	20,046	23,736	25,387	28,143
Student FTE Total [2]	**1418.87**	**1219.07**	**1351.10**	**1466.93**	**1532.37**
Student Majors [3]					
Mathmatics	86	100	106	131	121
Program Graduates [4]					
Bachelor Degree	12	7	9	11	15
Student Demographic Profile [5]	**86**	**100**	**106**	**131**	**121**
Female	44	45	66	61	62
Male	42	55	40	70	59
Faculty FTE Total [6]	**29.56**	**37.09**	**33.93**	**30.97**	**30.97**
Adjunct FTE	17.84	19.99	16.94	17.11	17.11
Contract FTE	11.72	17.1	16.99	13.86	13.86
Student/Faculty Ratio [7]	**48.00**	**32.87**	**39.82**	**47.37**	**49.48**

Note: Data provided by Institutional Research

*Student majors include pre-professional programs

1. Student Credit Hours Total represents the total department-related credit hours for all students per academic year. Includes only students reported in Banner system as registered for credit at the time of data downloads.

2. Student FTE Total is the Student Credit Hours Total divided by 30.

3. **Student Majors** is a snapshot taken from self-report data by students in their Banner profile as of the third week of the Fall term for the academic year.

4. **Program Graduates** includes only those students who completed all graduation requirements by end of Spring semester for the academic year of interest. Students who do not meet this requirement are included in the academic year in which all requirements are met. Summer is the first term in each academic year.

5. **Student Demographic Profile** is data retrieved from the Banner system.

6. **Faculty FTE** is the aggregate of contract and adjunct instructors during the fiscal year. **Contract FTE** includes instructional-related services done by "salaried" employees as part of their contractual commitments. **Adjunct FTE** includes instructional-related wages that are considered temporary or part-time basis. Adjunct wages include services provided at the Davis campus, along with on-line and Continuing Education courses.

7. **Student/Faculty Ratio** is the Student FTE Total divided by the Faculty FTE Total.

Appendix B: Contract/Adjunct Faculty Profile

Department of Mathematics

Contract Faculty Profile 2008-2012

NAME	GENDER	ETHNICITY	RANK	TENURE STATUS	HIGHEST DEGREE	YEARS OF TEACHING WSU	Other	TOTAL	AREAS OF EXPERTISE
Mahmud Akelbek	M		Assistant Professor	Tenure-track	Ph.D.	2			Combinatorics; Graph Theory
Blackinton, Dixilee	F		Instructor Specialist	Tenured	M.Ed.	26			Math Education
Cai, Chloe	F		Assistant Professor	Tenure-track	Ph.D.	5			PDE's; Math Education
Julian Chan	M		Assistant Professor	Tenure-track	Ph.D.	1			Cohomology, Statistics
Cocos, Mihail	M		Assistant Professor	Tenure-track	Ph.D.	6	4	10	Geometric PDE's; Differential Geometry
Sandra Fital-Akelbek	F		Assistant Professor	Tenure-track	Ph.D.	5			Matrix Theory
Foster, James	M		Professor	Tenured, Retired 2012	Ph.D.	35			Probability, Numerical Analysis, and Approximation theory
Ghoreishi, Afshin	M		Professor	Tenured	Ph.D.	21			Applied Mathematics
Kidman, Kent	M		Professor	Tenured	Ph.D.	23	2	25	Linear Algebra, Matrix Theory
Kvernadze, George	M		Professor	Tenured	Ph.D.	15			Approximation Theory

Ondrus, Matthew	M		Assistant Professor	Tenure-track	Ph.D.	6 3 9	Representation theory of quantum groups and related algebras
Peters, James	M		Associate Professor	Tenured	Ph.D.	25	PDE's and Numerical Analysis
Pugmire, Diane	F		Instructor Specialist	Deceased in 2009	M.Ed.	26	Math Education
Steele, T.H.	M		Professor	Tenured	Ph.D.	19	Real Analysis
Talaga, Paul	M		Professor	Tenured	Ph.D.	35	Differential Equations
Wills, Michael	M		Assistant Professor	Tenure-track, dismissed 2012	Ph.D.	7 1 8	Functional Analysis
Developmental Mathematics Program							
Alice Allred	Female	Caucasian	Lecturer	No	MEd	12 (lecturer) 1 23 11 (adjunct)	Math Ed, Dev Math – PreCalculus
Brenda Acor	Female	Caucasian	Lecturer	No	MA	11 11 22	Dev Math – Calculus, Math Ed
Loyal Baker	Male	Caucasian	Lecturer	No	MS	10 12 (PT) 22	Dev Math, Statistics
David Imig	Male	Caucasian	Lecturer	No	MS	10 4 14	Engineering Math
Mary Jo Hansen	Female	Caucasian	Lecturer	No	MS	15 7 22	Statistics, Math
McKee, Deborah	Female	Caucasian	Lecturer	No	BS	15	
Darrell Poore	Male	Caucasian	Lecturer	No	BS	11 2 (PT) 13	Dev Math – Calculus

Carrie Quesnell	Female	Caucasian	Lecturer	No	BS	12	0	12	Dev Math, PreCalculus
John Thaeler	Male	Caucasian	Asso Prof	Yes	Doctorate	30	10	40	Dev Math, Math Ed
Mary Ellen Yonkee	Female	Caucasian	Lecturer	No	BS	10			Dev Math
Pamala Schilling	Female	Caucasian	Lecturer	No	BS	5			Dev Math
Kathryn Van Wagoner	Female	Caucasian	Director	No	Doctorate	1			

Adjunct Faculty Profile 2008-2012

NAME	GENDER	ETHNICITY	JOB TITLE	YEARS OF EMPLOYMENT WSU	Other	TOTAL	Degree
Badger, Lee	M		Adjunct (retired faculty)	25			Ph. D.
Baker, Stacie	F		Adjunct	13			BS
Barney, Corine	F		Adjunct	11			BS
Dickson, Neil	M		Adjunct (retired faculty)	7			Ed.D.
Ellis, Maria	F		Adjunct	7			BS
Emami, Morteza	M		Adjunct	15			MBA
Emami, Robab	F		Adjunct	10			Ph.D.
Fisher, Andrew	M		Adjunct	1			Ph. D.

Gabbitas, Allison	F		Adjunct	5	BS
Green, Bill	M		Adjunct	8	BS
Haueter, Gordon	M		Adjunct	6	BS
Hollopeter, W.	M		Adjunct	10	BS
Hunt, Corinne	F		Adjunct	15	BS
Jee, Richard	M		Adjunct	17	M.Ed.
Kohler, Eric	M		Adjunct	8	BS
Marx, Christine	F		Adjunct	17	BS
Quintrequeo, Jeree	F		Adjunct	7	BS
Ruiz, Donna	F		Adjunct	15	MStat
Salt, Jeffrey	M		Adjunct	11	BS
Schweitzer, John	M		Adjunct	3	BS
Walthers, Philip	M		Adjunct	15	MS
Wheeler, Nicole	F		Adjunct	5	BS
Wheeler, Randall	M		Adjunct	5	BS
Wilkinson, Jenette	F		Adjunct	5	BS

Appendix C
Contract Staff Profile

NAME	GENDER	ETHNICITY	JOB TITLE	YEARS OF EMPLOYMENT			AREAS OF EXPERTISE
				WSU	Other	TOTAL	
Anneli Byrd	F		Secretary II (Mathematics); Quit	3			
Debi Larson	F		Secretary II (Developmental Math)	2			

Appendix D: Financial Analysis Summary

Mathematics					
Cost	**07-08**	**08-09**	**09-10**	**10-11**	**11-12**
Direct Instructional Expenditures	1,211,351	1,277,100	1,217,306	1,338,834	1,380,961
Cost Per Student FTE	1,211,351	1,277,100	1,217,306	1,338,834	1,380,961

Funding	**07-08**	**08-09**	**09-10**	**10-11**	**11-12**
Appropriated Fund	1,211,351	1,277,100	1,217,306	1,338,834	1,380,961
Other:					
Special Legislative Appropriation					
Grants of Contracts					
Special Fees/Differential Tuition					
Total	1,211,351	1,277,100	1,217,306	1,338,834	1,380,961

Note: Data provided by Provost’s Office

Appendix E: External Community Involvement Names and Organizations

Name	Organization
Donna Ruiz	Lockheed Martin
Andrew Redd	University of Utah Hospital
Gordon Haueter	Davis High School Teacher
Randy Wheeler	Roy High School Teacher
John Schweitzer	High School Teacher (In Salt Lake Area)
John Berkenpas	IBM
Teddi Safman	Utah System of Higher Education (Regents representative)
Diana Sudreth	Mathematics Coordinator, State Office of Education
Brian Vandenburg	Hill Air Force Base
Adam Shephard	Hill Air Force Base
Joyce Peters	Hill Air Force Base

Appendix F: External Community Involvement Financial Contributions

Organization	Amount	Type
		Grant
		Contract
		Donation

Appendix G. Sample of general education renewal form for Math QL 1050, College Algebra

---

GENERAL EDUCATION COURSE PROPOSAL
WEBER STATE UNIVERSITY
QUANTITATIVE LITERACY

Area: **QUANTITATIVE LITERACY (QL)**
Date: _____9/14/2011_______
College: _Science_____________________
Department: Mathematics_____________
Catalog Abbreviation: _MATH QL1050_______
Catalog Title: __College Algebra___________
Course Number: _Math 1050_____________
Credit Hours: __4___
Substantive: ______
New: ______
Revised: ______
Renewal __X___
Effective Date ____7/1/2011________
Course description as you want it to appear in the catalog:
This course covers a survey of college mathematics and is also a preparatory course for calculus. Topics from continuous mathematics include polynomial, rational, exponential and logarithmic functions, equations and their applications, absolute value, polynomial and rational inequalities, and nonlinear systems. Topics from discrete mathematics include matrices, matrix algebra and inverses, determinants, sequences and series, counting techniques, and an introduction to probability. In addition, mathematics of finance, rational zero and binomial theorems and mathematical induction are covered briefly.

QUANTITATIVE LITERACY (QL) GENERAL EDUCATION MISSION STATEMENT

It is the mission of Weber State University to produce graduates that can reason quantitatively within the context of their majors and career goals. This includes understanding information and reasoning that is numerical, geometric, algebraic, graphical, and statistical -- and at the level of sophistication of college algebra (e.g. MATH 1050).

QUANTITATIVE LITERACY LEARNING OUTCOMES

A student completing a Quantitative Literacy general education course should be able to demonstrate a reasonable understanding of the following core objectives.
Provide a justification of how the proposed course prepares students to successfully demonstrate competency in ***EACH*** *of the core objectives. Cite specific lecture topics, written assignments, and/or lab projects and explain how they address each of the core competencies. Refer to your attached syllabus as needed.*
Objective 1: Interpret mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them.
Justification: Math 1050, College Algebra discusses eight basic mathematical topics at the

college level (see the course coverage topics in the syllabus). While several of these, inequalities, functions, polynomials, exponential and logarithmic functions are introduced in the high school intermediate algebra course, Math 1050 goes over these again and extends their usage. Math 1050 gives an introduction to the remaining topics listed under the course coverage. The topics are explained numerically, graphically and with sketches and tables. It is shown how these structures are symbolically represented. Examples of how they are used to give quantitative representation and solve physical problems are given. For example the differences between algebraic expressions, equations, inequalities and functions are discussed. One of the most basic and useful of mathematical structures is the function. The course discusses the differences and characteristics of four of the most basic types of functions: polynomials (including quadratics), rational, exponential and logarithmic. The differences in their formulas and graphs are identified. These functions are used to construct models for physical problems. Student assignments consist of understanding the definitions, laws, properties and relationships. They also consist of working with the notation and symbols, sketching graphs of functions, and solving applied problems. The other topics in the course content of the syllabus are discussed in a similar manner.

Objective 2: Represent mathematical information symbolically, visually, numerically, and verbally.

Justification: This course is rich in numerous symbolic, visual, numerical and verbal representation of mathematical information. For instance, topics like inequalities, algebraic equations, systems of linear or non-linear equations, exponential and logarithmic equations, the binomial formula, arithmetic and geometric sequences, etc. deal with the symbolic representation of mathematical information. Topics like graphs of algebraic and rational functions teach students about visual representations. Matrices, matrix algebra, inverse matrices and determinants illustrate important numerical representations in mathematics. A number of important definitions and applied problems show how mathematical information can also be presented verbally.

Objective 3: Use arithmetical, algebraic, geometric, and statistical methods to solve problems.

Justification: Various methods for solving problems are discussed in Math 1050. Solving even an elementary linear equation requires arithmetic methods. As an example, when solving problems in the mathematics of finance, students learn how to use algebraic methods to solve important applied problems. A number of topics in College Algebra, including problems that involve calculating perimeters, areas, surface areas, etc., illustrate applications in Geometry. Topics such as counting, permutations, combinations and probability show probabilistic/statistical techniques of solving problems.

Objective 4: Estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results.

Justification: In College Algebra, students are taught how to check the correctness of answers. Examples include: solving algebraic equations, systems of linear or non-linear equations, dividing using synthetic division and checking whether a given a function (matrix) is the inverse of the given function (matrix). Students are also taught how to estimate solutions when they cannot be obtained explicitly: Descartes' Rule of Signs and Intermediate Value Theorem can be used to estimate the root of a polynomial equation. It is important to know that alternative methods exist to solve a given problem. This objective is illustrated by three different methods for solving of a square system of linear equations: Gaussian elimination, Cramer's rule and inverse matrices. The topic of Quadratic Models shows how to select an optimal result for quantities expressed by quadratic equations.

Objective 5: Recognize that mathematical and statistical methods have limits.

Justification: In Math 1050, students are shown not only the power of mathematical and statistical methods, but their limitations as well. For example, many algebraic, exponential or logarithmic equations can be solved symbolically. However, when it comes to actual numerical values of solutions, unless solutions are rational, they cannot be evaluated exactly. Although The Fundamental Theorem of Algebra guarantees existence of a root for any polynomial equation of degree one or higher, finding the root explicitly may not always be possible. Similarly, calculating the probabilities of events involves the major assumption of equally likely outcomes. However, in practice outcomes are seldom equally likely. Thus, calculations involving the probabilities of events do have limitations. Limitations also exist when mathematical models are used to solve physical problems as the model only includes the most important features of the application.

COMPLETE THE FOLLOWING

1. Has this proposal been discussed with and approved by the department?

   This proposal has been discussed and unanimously approved by the department.

2. List those general education courses in other departments with similar subject matter and explain how this course differs.

   There are none.

3. If the proposed new general education course affects course requirements or enrollments in other departments, list the departments and programs involved and attach comments from each.

   Not applicable, this is not a new course.

4. Attach a syllabus of the course. Include the number of contact hours per week and the format of these hours (e.g., lecture, lab, field trip, etc.).

   See Attachment

New Courses Only:

5. Discuss how you will assess student learning outcomes associated with this course

   This course is not new.

Current General Education Courses and Existing Courses Seeking General Education Status:

6. Discuss how you have assessed the applicable or identified student learning outcomes associated with this course.

<u>Course Assessment</u>

Assessment of Math 1050, College Algebra is mainly done by the department level QL/Lower Division Committee and discussions during department meetings. The following are done:

1. Collection of data on pass rates of QL courses at WSU and at other state schools (if we can obtain that information from the state office). See the attachment.
2. Consideration of alternate texts for the course
3. Consideration and discussions about adjusting course content and the level and extent of problem solving
4. Attendance of the yearly majors meetings organized by the Regent's Majors Committee
5. Teaching evaluations are completed by the students of each section.

Adjunct Instructors

A large number of adjunct instructors teach the QL courses and in particular Math 1050. Currently, Fall 2011 there are 10 adjunct instructors teaching 13 of the 25 sections of Math 1050. Assessment and oversight of Adjunct Instructors is mainly done by the Department Chair. The department maintains a set of policies for Adjunct Instructors (it is attached). The Department Chair does the following:

1. Hold at least one retreat each year for Adjunct Instructors to go over policies, have discussions, and answer questions
2. Review their teaching evaluations and address problems that may arise
3. Review their graded final exams to see if they are covering most of the course material
4. Hold an interview with each instructor to discuss their courses and answer questions

Student Assessment

Student assessment is accomplished by reading and problem solving assignments, quizzes and exams. All instructors, Faculty and Adjuncts give 3 or 4 Midterm Exams and a Final Exam. The instructors design their own exams. They make up questions and problems similar to those discussed in the course. There may be a few fill in the blank, short answer, multiple choice or true/false questions, but most of the exams consist of questions that require the students to work out the solution and present any pertinent work. The questions are designed to see if they have learned the mathematics in the course, that is to determine if students can correctly use the symbols, understand the graphical or geometric relationships and understand the definitions and properties. There are questions that require students to use arithmetic, algebra and geometry to solve problems. There are questions about setting up and solving applied problems. All instructors grade their own exams. Seldom does a correct answer alone get full credit. Student's work is being checked to see if they can correctly set up and use the language of Math to get to an answer. Some instructors also grade homework and/or quizzes. Some instructors require students to answer questions using Math XL (the computer program used in TERM of the Developmental Math Program.) Others make Math XL available to students but do not require it.

7. How has this assessment information been used to improve student learning?

Course Assessment

1. Faculty discussions indicated that a major reason that students are failing Math 1050 is that they are unable to do basic algebra. Math 1050 does not review such things as working with fractions and exponents. Even though students had satisfied the prerequisite, they had forgotten basic algebra. As a result prerequisite expirations were instituted. More recently the Developmental Math Program has developed TERM. It is hoped that it will help students attain and retain the basic algebraic skills and other introductory knowledge such as exponential and logarithmic functions used in QL math courses. The Placement Policy from the Catalog is attached.
2. Each year department representatives attend "Majors Meetings" to coordinate course content, prerequisites, and other aspects of the course with other state schools. Recently this has resulted in our consideration of changes in the prerequisite expirations.
3. We have made two offices available to Adjunct Instructors in which they can meet with students.
4. Tutoring Labs have been instituted. Efforts are made to ensure that the tutors have

sufficient knowledge to help students. Most if not all the tutors hired for the "The Solution Space", a tutoring lab on the Math Floor are capable of tutoring up through Calculus II.
5. Pass rates are similar to national rates.

<u>Adjunct Instructor Assessment</u>

1. The reviews of the final exams that Adjunct Instructors give in their courses indicate that they are covering most of the course topics.
2. Student Teaching evaluations indicate that most instructors are doing a good job. In one instance though, an instructor was more difficult than average. After an interview and several discussions he has reduced his expectations of student performance.

Other assessments have been done:

1. To see if students were obtaining knowledge and skills, a sample of Math 1050 sections were given a pre course test and a post course test. The results indicated that students had gained a lot from the course.
2. To coordinate course topics in Math 1050 with other state schools a very detailed spread sheet was completed for the Regent's Majors Committee. This is helping align the course across state schools.

Appendix H. Measureable Course Learning Outcomes for required courses within the program.

<u>Learning Outcomes for Math 1060, Trigonometry</u>

Upon successful completion of Math 1060, students will be expected to:

1. Understand trigonometric and inverse trigonometric functions and be able to find their exact values for standard angles and numbers.
2. Be able to solve right and oblique triangles using the definitions of trigonometric functions and Laws of Sines or Cosines.
3. Solve application problems by solving appropriate triangles.
4. Graph trigonometric functions.
5. Know standard trigonometric identities and be able to establish or disprove equations as trigonometric identities.
6. Be able to solve trigonometric equations.
7. Understand vectors and vector algebra and be able to solve applied problems using vectors.
8. Understand polar coordinates and graph polar equations.

<u>Learning Outcomes for Math 1210, Calculus I</u>

Upon successful completion of Math 1210, students will be expected to:

1. Use algebraic techniques to evaluate limits.
2. Find derivative of algebraic and trigonometric functions, defined explicitly or implicitly, using differentiation rules: power, product, quotient, and chain rules and implicit differentiation.
3. Interpret derivative as the rate of change and use it to find equation of a tangent line, find velocity and acceleration, approximate value of a function, approximate a zero of a function or solve related rate problems.
4. Understand the role of first and second derivatives in the shape of graphs.
5. Solve optimization application problems.
6. Evaluate definite and indefinite integrals using basic integration techniques, including substitution.
7. Interpret the definite integral as a sum and use it to find areas, volumes or the work done by a variable force.
8. Be able to use definitions to prove value of a limit, find derivative of a function or evaluate a definite integral, for simple functions.
9. Understand important theorems such as Intermediate Value Theorem, Extreme value Theorem, Rolle's Theorem, Differential or Integral Mean Value Theorems or Fundamental Theorem of Calculus.

<u>Learning Outcomes for Math 1220, Calculus II</u>

Upon successful completion of Math 1220, students will be expected to:

1. Evaluate limits using L'Hospital's Rule.
2. Find derivative of exponential, logarithmic, inverse trigonometric and inverse functions.

3. Evaluate definite, indefinite, and improper integrals using integration techniques: integration by parts, trigonometric substitution, partial fractions and trigonometric identities.
4. Use integrals to find arc length, surface area, pressure, center of mass or probability.
5. Understand parametric equations and polar coordinates and use them in graphing, finding tangent lines, or calculating arc lengths and areas.
6. Be familiar with conic sections.
7. Calculate the sum of a geometric or telescoping series.
8. Test for convergence of a series using an appropriate test: divergence, integral, comparison and limit comparison, ratio, root, or alternating series.
9. Find the power series of functions, determine their radius and interval of convergence, and use differentiation, integration and combination to develop new power series or use them to estimate, integrate or find the limits.

Math 1630 (Discrete Mathematics Applied to Computing) Learning Outcomes:
Upon successful completion of Math 1630, students will be expected to:
1. Understand basic mathematical logic, both the definitions and applications to mathematical proof.
2. Write proofs using Mathematical Induction.
3. Understand functions and recursion.
4. Understand basic discrete structures (e.g. relations, graphs, or trees)
5. Be able to write computer code for functions, recursion, or a discrete data structure.

Learning Outcomes for Math 2210, Calculus III
Upon successful completion of Math 2210, students will be expected to:
1. Understand vectors and vector algebra. Use vectors to solve applied problems and find equations of lines and planes is three dimensions.
2. Understand vector-valued functions. Find the derivatives and integrals of vector-valued functions. Find arc length or curvature of space curves, or use vector-valued functions to describe motion in space.
3. Be familiar with quadric surfaces.
4. Understand limits of functions of two variables and find partial derivatives of functions of two or more variables.
5. Use partial derivatives to find directional derivatives, equations of a tangent planes or approximate values of functions of two or more variables and solve optimization application problems involving functions of two variables
6. Understand multiple integrals. Evaluate double and triple integrals in Cartesian, polar, cylindrical and spherical coordinates.
7. Interpret the multiple definite integral as a sum and use it to find areas, volumes, mass or moments.
8. Understand vector fields and use them to find line integrals, surface integrals or work.
9. Understand important theorems such as Green’s, Stokes’ or divergence theorems.

Math 2250 (Linear Algebra and Differential Equations) Learning Outcomes:

Upon successful completion of Math 2250, students will be expected to:

1. Solve a first order differential equation that is linear, separable or exact.
2. Solve a second or higher order linear non homogeneous differential equation with constant coefficients by the method of undetermined coefficients, the method of variation of parameters or by reduction of order.
3. Solve a linear homogeneous or non homogeneous system of differential equations with constant coefficients by any method.
4. Reformulate a linear system of equations as a single matrix equation and solve it by Gaussian Elimination, the use of inverses or Cramer's Rule.
5. Identify and work with generic vector spaces, determine subspaces, bases and dimension and characterize orthogonality properties.
6. Find the eigenvalues and corresponding eigenspaces for a generic (n x n) matrix.

<u>Math 2270 (Elementary Linear Algebra) Learning Outcomes</u>:

Upon successful completion of Math 2270, students will be expected to:

1. Know how to solve systems of linear equations.
2. Know, understand, and be able to apply the concepts of matrices, matrix algebra, and determinants to solve problems.
3. Know, understand, and be able to apply the concepts of vector spaces to calculate results, establish basic theorems, and prove conjectures in a clear and mathematically correct way.
4. Know, understand, and be able to apply the concept of linear transformations to calculate results, establish basic theorems, and prove conjectures in a clear and mathematically correct way.
5. Be able to understand and to compute eigenvalues and eigenvectors, and apply these concepts to solving problems.

<u>Learning Outcomes for Math 2280, Ordinary Differential Equations</u>

Upon successful completion of Math 2280, students will be expected to:

9. Classify equations as an ordinary differential equation or not. Classify ordinary differential equations by order and linear versus non-linear. Discuss existence and uniqueness of solutions of ordinary differential equations and/or draw and interpret direction fields of the first order ordinary differential equations.
10. Create an ordinary differential equation with initial value(s) to model real life applications, for example, falling bodies, growth and decay, input-output, or position of a mass on a spring. Solve the model and interpret the results.
11. Solve separable, exact and linear first order ordinary differential equations.
12. Solve second or higher order, homogeneous, linear, constant coefficients ordinary differential equations.
13. Solve second or higher order ordinary differential equations using the methods of undetermined coefficient, variation of parameter and reduction of order, as applicable.
14. Use the Laplace Transform technique to solve second order ordinary differential equations with initial values.

15. Use the series method to solve second order ordinary differential equations near an ordinary point.

Learning Outcomes for MATH 2120 Euclidean Geometry

Upon successful completion of Math 2120, students will be expected to:

1. Know when it is necessary to write a proof and develop the ability to write proofs in the setting of Euclidean geometry.
2. Know and understand definitions and basic theorems regarding Euclidean notions of angles, congruence, parallel lines, similarity, and circles.
3. Solve problems and prove theorems relating to Euclidean notions of angles, congruence, parallel lines, similarity, and circles.

Math 3110 (Foundations of Algebra) Learning Outcomes:

Upon successful completion of Math 3110, students will be expected to:

6. Understand basic mathematical logic, both the definitions and applications to mathematical proof.
7. Understand the concept of proof and demonstrate proof writing skills.
8. Write proofs in the areas of basic set theory, number theory, and algebra.
9. Gain exposure to more advanced topics in algebra such as group theory and ring theory.
10. Be able to understand abstraction.

MATH 3120 Learning Outcomes:

Foundations of Euclidean and Non-Euclidean Geometry (Math 3120)

Upon successful completion of Math 3120, students will be expected to:

1. Know and understand basic definitions of Euclidean, neutral, and hyperbolic geometry.
2. Demonstrate the ability to write proofs clearly and concisely.
3. Use axiom systems to prove basic theorems in Euclidean, neutral, and hyperbolic geometry.
4. Use basic theorems of Euclidean, neutral, and hyperbolic geometry to prove additional theorems.

Math 3160 (Number Theory) Learning Outcomes:

Upon successful completion of Math 3160, students will be expected to:

1. Prove an appropriate statement using Mathematical Induction.
2. Solve a linear Diophantine and congruence equation.
3. Be familiar with the Fundamental Theorem of Arithmetic, the Chinese Remainder Theorem, and Euler’s Theorem, and be able to use those results to prove and/or calculate a posed theoretical or applied problem in a clear and mathematically correct way.
4. Be familiar with multiplicative functions, the Euler Phi-function, Mobius inversion, and be able to use those results to prove and/or calculate a posed theoretical or applied problem.

5. Be familiar with primitive roots and be able to use this concept to prove and/or calculate a posed theoretical or applied problem.

Learning Outcomes for Math 3280, Dynamical Systems

Upon successful completion of Math 3280, students will be expected to:

1. Solve one-dimensional first order ordinary differential equations.
2. Analyze one-dimensional first order ordinary differential equations, such as plotting phase lines and slope fields and trajectories, and identifying stability of equilibrium points.
3. Recognize bifurcations and find bifurcation points of one-dimensional or planar dynamical systems.
4. Solve and analyze linear, planar dynamical systems.
5. Analyze nonlinear autonomous planar dynamical systems, such as plotting phase plane portraits, identifying stability of equilibrium points, and existence or non-existence of periodic solutions and limit cycles.
6. Use both analytic and geometric techniques to analyze mathematical models such as population dynamics or harmonic oscillations.
7. Use software packages, such as Mathematica, to plot phase portraits of dynamical systems and to conjecture/demonstrate their properties.
8. Learn two additional topics, for example, existence and uniqueness theorems, Poincare-Bendixon theorem, Liapunov functions, Hamiltonian and dissipative systems, higher dimensional systems, discrete dynamical systems, chaos, and contraction mapping theorem.

Math 3410-3420 (Probability and Statistics) Learning Outcomes:

Upon successful completion of Math 3410 and 3420, students will be expected to:

1. Be able to compute continuous and discrete probabilities.
2. Be able to effectively analyze data.
3. Be able to construct a confidence interval.
4. Be able to construct and test a hypothesis.
5. Be familiar with regression.
6. Be introduced to analysis of variance, and related topics.

Math 3550 (Introduction to Mathematical Modeling) Learning Outcomes:

Upon successful completion of Math 3550, students will be expected to:

1. Perform a dimensional analysis.
2. Be able to generate and use random numbers.
3. Be able to construct or work with a differential equation or discrete dynamical system model.
4. Construct a model application in business or in the biological, physical, or social sciences.

MATH 3610 (Graph Theory) Learning Outcomes:

Upon successful completion of Math 3610, students will be expected to:

1. Explain basic definitions and properties associated with simple planar graphs, including isomorphism, connectivity, and Euler's formula, and describe the difference between Eulerian and Hamiltonian graphs.
2. Describe and implement some of the graph algorithms, including finding a minimum weight spanning tree in a connected graph, finding a maximum matching and a maximum weight matching in a bipartite graph, and finding a Euler trail in a graph or digraph.
3. Understand and apply some of the classical theorems of graph theory, including Kuratowski's theorem, Konig's theorem, Hall's theorem, Four Color theorem, Ramsey's theorem, and Tutte's theorem.
4. Formulate short proofs using the following methods: direct proof, indirect proof, proof by contradiction, and case analysis.

<u>Learning outcome for MATH 3620 Enumeration</u>:

Upon successful completion of Math 3620, students will be expected to:

Apply different techniques to solve combinatorial problems.

1. Find recurrence relations for some sequences, and be able to apply generating-function methods to solve combinatorial problems.
2. Apply the Inclusion-Exclusion Principle to a variety of problems.
3. Advance their ability in reading and constructing proofs by using combinatorial methods.

<u>Learning Outcomes for Math 3710, Boundary value Problems</u>

Upon successful completion of Math 3710, students will be expected to:

1. Classify equations as partial differential equations or not. Classify partial differential equations by order and linear versus non-linear. Recognize heat, wave or potential equations and boundary conditions of the first kind (Dirichlet B.C.'s), second kind (Neumann B.C.'s) or third kind (Robin B.C.'s).
2. Create a partial differential equation with auxiliary conditions (boundary conditions and initial values) to model real life applications, for example, heat conduction or wave propagation, or their related time-independent states. Solve the model and interpret the results.
3. Compute Fourier series, Fourier sine series or Fourier cosine series of simple functions. Use differentiation, integration, combination and/or evaluation of known Fourier series to build Fourier series for other functions or to find the sum of certain series, for example, $\sum_{n=1}^{\infty} 1/n^2$.
4. Find eigenvalues and eigenfunctions of simple Sturm-Liouville eigenvalue problems and/or derivation of some formulas for or results of simple Sturm-Liouville eigenvalue problems, for example, Lagrange's identity, Greens' formula, or Rayleigh quotient.
5. Apply the method of separation of variables to solve one dimensional heat or wave equations in bounded domains.

6. Apply the method of separation of variables to solve two or higher dimensional heat, wave or potential equations in bounded domains.
7. Solve heat, wave or potential equations using the eigenfunction expansion technique and/or in domains requiring the use of special functions, for example, Legendre polynomials or Bessel's functions.
8. Solve all three heat, wave and potential equations in bounded domains.

Math 3810 (Complex Variables) Learning Outcomes:
Upon successful completion of Math 3810, students will be expected to:
1. Know, understand, and be able to apply the algebra and geometry of complex numbers.
2. Demonstrate ability to understand and perform complex differentiation.
3. Demonstrate ability to understand and calculate path integrals and use the Cauchy integral formula.
4. Know, understand, and be able to apply the concepts of series.
5. Know, understand, and be able to apply the concepts of residues and poles.

Math 4110-4120 (Modern Algebra I and II) Learning Outcomes:
Upon successful completion of Math 4110 and 4120, students will be expected to:
1. Clearly state and use definitions pertaining to group theory, ring theory, and field theory.
2. Write proofs of basic abstract facts regarding group theory, ring theory, and field theory.
3. Write mathematical solutions and proofs in a clear and concise manner.
4. Think critically and form conjectures related to group theory, ring theory, and field theory.
5. Use the fundamental theorems from group theory, ring theory, and field theory to prove additional theorems and better understand examples.

Math 4210-4220 (Introductory Analysis) Learning Outcomes:
Upon successful completion of Math 4210 and 4220, students will be expected to:
6. Effectively write mathematical solutions and proofs in a clear and concise manner.
7. Know, understand, and be able to apply basic results from set theory and point-set topology to establish theorems and prove conjectures in a clear and mathematically correct way.
8. Demonstrate ability to think critically by proving mathematical conjectures and establishing theorems from calculus.
9. Demonstrate an intuitive and computational understanding of continuity, differentiation, and integration through calculations and solving application problems.
10. Know, understand, and be able to apply the concepts of metric spaces to establish theorems and prove conjectures in a clear and mathematically correct way.
11. Know, understand, and be able to apply the concepts of sequences and functions to establish theorems and prove conjectures in a clear and mathematically correct way.

Math 4320 (Topology) Learning Outcomes:

After successful completion of Math 4320, a student should be able to:

1. Write mathematical solutions and proofs in a clear and concise manner.
2. Effectively locate and use prior information to prove theorems and establish mathematical results.
3. Clearly state and use definitions and results of topology.
4. Think critically by forming and proving mathematical conjectures from the theory of metric spaces and the theory of topological spaces.

<u>Math 4610-4620 (Numerical Analysis I and II) Learning Outcomes</u>:

Upon successful completion of Math 4610 and 4620, students will be able to:

1. Approximate the solution of an equation in one variable.
2. Use polynomials to interpolate and approximate functions.
3. Perform numerical differentiation and integration.
4. Solve a system of linear equations.
5. Solve initial value problems and boundary value problems.
6. Approximate the eigenvalues of a matrix.
7. Solve non-linear non linear systems of equations.
8. Compose computer programs as necessary for the topics above.

<u>Learning Outcomes for Math 4710, Partial Differential Equations</u>

Upon successful completion of Math 4710, students will be expected to:

1. Classify equations as partial differential equations or not. Classify partial differential equations by order and linear versus non-linear. Classify second order partial differential equations as elliptic, parabolic and hyperbolic and transform to their canonical forms.
2. Use the method of characteristics to solve first order linear or quasi linear partial differential equations.
3. Apply the method of separation of variables to solve heat, wave or potential equations in bounded domains.
4. Apply the method of Fourier or Laplace Transform to solve heat, wave or potential equations in unbounded domains.
5. Use Green's functions to solve heat or potential equations.
6. Apply D'Alembert's solution to wave equations.
7. Apply the maximum principle to show uniqueness of solutions of heat or potential equations.
8. Solve all three heat, wave and potential equations in bounded and unbounded domains.

2010

Learning Outcomes: Upon successful completion of Math 2110, students will be expected to:

1. Demonstrate fluency in arithmetic operations, place value concepts, and converting between fractions, decimals and percentages.
2. Illustrate and model multiple algorithms for each arithmetic operation.
3. Appropriately use properties and number theory concepts to simplify arithmetic processes.
4. Demonstrates number sense by using mental math, estimation, and/or comparisons.
5. Solve and coherently write solutions for word problems.

2020

Learning Outcomes: Upon successful completion of Math 2020, students will be expected to:

1. Estimate and measure in English and metric units and convert units within each system when appropriate.
2. Name, classify, define, and state attributes of common two-dimensional and three-dimensional objects.
3. Solve various geometry problems, including geometric constructions.
4. State, use, and prove the Pythagorean Theorem.
5. Gather, organize, and depict data using various charts and graphs, and analyze data sets.

3060

Learning Outcomes: Upon successful completion of Math 3060, students will be expected to:

1. Solve basic probability problems where the experiment involves both simple and compound events.
2. Know permutations, combinations, mixed counting principles, and be able to use them in problem solving.
3. Compute, understand and use measures of center and measures to analyze single variable data.
4. Collect, display and analyze data using a variety of techniques.
5. Understand and be able to use random variables and various distributions to model and analyze data.

MTHE 3070 Geometry for Elementary Teachers

After successful completion of this course students will

1. Know the basic theorems and be able to prove them or explain the proof
2. Be able to prove basic statements using theorems and postulates(like: problems involving congruent, similar triangles, …)
3. Be able to create school activities for a geometry lesson using computer software

MTHE 3080 Number Theory for Elementary Teachers

Upon successful completion of Math 3080, students will be expected to

1. Use basic number theory concepts to explain arithmetic and solve problems.
2. Prove conjectures about sets of integers.
3. Understand in greater depth the application of number theory to arithmetic and improve their ability to do mental arithmetic.

MTHE 4040 Mathematical Problem Solving for Elementary Teachers

Upon successful completion of Math 4040, students will be expected to:

1. Solve non-routine mathematical problems and present them in a way that others can understand their reasoning process and their answer.

MTHE 4010 Capstone Mathematics for High School Teachers

Learning Outcomes

A student who has successfully completed MTHE 4010 will have demonstrated proficiencies in understanding and being able to prove theorems for at least half of the following topics in mathematics designed for future high school teachers:

1. Real and complex numbers
2. Functions
3. Equations
4. Congruence
5. Similarity
6. Trigonometry

Appendix I. Department Committees and Charges

COMMITTEE AND COURSE COORDINATION ASSIGNMENTS
2012-2013

Academic Computing
Julian Chan (chair)
James Peters
Mahmud Akelbek

Nominations College of Science Committees (If Convened)
Academic Computing: Julian Chan
Building Committee: Paul Talaga
Curriculum: George Kvernadze
Faculty Senate:
Graduation: George Kvernadze
Hearing Committee: TH Steele
Honors/Awards: Sandra Fital-Akelbek
Museum: Dixie Blackinton
Public Relations/ Events: Chloe Cai
COS Rank/Tenure: Kent Kidman
Safety: Mihail Cocos
Sigma Xi: Mahmud Akelbek
Science Fair: James Peters
Spence Seager Award: Dixie Blackinton
Undergraduate Research: Matt Ondrus

Assesment/Planning
Kent Kidman (Chair)
TH Steele
Julian Chan

Curriculum
Kent Kidman (Liaison-Math Ed)
George Kvernadze (Chair)
TH Steele (Spring)
James Peters

Math Education
Dixie Blackinton
Chloe Cai
Sandra Fital-Akelbek
Kent Kidman
Matt Ondrus (chair)

Promotion/Tenure
Paul Talaga
George Kvernadze
TH Steele

Quantitative Literacy
Mihail Cocos
Afshin Ghoreishi (Chair)

Recruitment/Public Relations
Chloe Cai (Chair)
Afshin Ghoreishi (Extended Campus)
Mahmud Akelbek (Math Factor)

Math Factor Advisor
Mahmud Akelbek

Research/Scholarship
Mihail Cocos (Chair) (Library)
Afshin Ghoreishi (JP&RG advisor)
Matt Ondrus (Undergrad Research)

Scholarships/Awards
Dixie Blackinton
Sandra Fital-Akelbek (chair)
James Peters

CHARGES FOR MATHEMATICS DEPARTMENT COMMITTEES 2012-2013

Academic Computing:

Oversee computers and equipment for the classrooms and the computer lab. Apply for equipment grants as needed. Chair is on College of Science Academic Computing Committee.

Curriculum:

Recommend and oversee changes in courses and programs. Coordinate with the Math Education committee on MTHE courses and MATH courses that mostly serve math teaching majors/minors. Help with assessment of the Applied Math and Math Programs. Help the Chair decide on the number and frequency of MATH courses numbered above 2000. Committee Chair is a member of the college curriculum committee.

Action items: **Help Develop/Discuss Learning Out Comes for MATH courses numbered 2250, 2270, 2280.**

Math Education:

Oversee Math Teaching Courses and Programs. Respond to any new endorsement requirements. Write and support grants for teacher training, enrichment, and Math Ed projects. Recommend textbooks for Math Ed courses. Help with the assessment of math education courses and programs. Oversee observations of student teachers.

Action items: **Help Develop/Discuss Learning Out Comes for MATH 2010 and 2020 and the MTHE courses.**

Calculus, Quantitative Literacy, and Lower Division Courses:

Oversee and recommend textbooks and software for the courses: Math 1030, 1040, 1050, 1060, 1080. Recommend curricular changes in these courses and Discrete Math Applied to Computers, Math 1630. Help with the assessment of these courses and QL. Monitor how well students coming out of the Developmental Program or the placement test are prepared. Make recommendations on ways to assess and mentor Adjunct Instructors and Developmental Math Instructors. Make textbook recommendations for the Calculus sequence.

Action Items: **Develop Learning Out Comes for MATH 1060, 1200, 1210, 1220, 2210**.

Recruitment/Public Relations and Development:

Recommend ways for the department to increase the number of our majors. Math Factor Advisor is part of this committee. Help with this year's Major Fest. Update the display with faculty photos and info. Update the display with our majors names and pictures. Make recommendations for the Franklin Richards Lectures in Mathematics and The Ritchey Lecture.

Action Items: Design Flyer and a poster for the Math programs to be used at the Major Fest and Development events.

Math Factor Advisor(s)

Plan with student officers meetings, talks, with our majors/minors, some of which should include faculty. Raise funds by selling books or other ways. Help with majors' room. Have Math Factor help with Major Fest.

Research/Scholarship:

Schedule department colloquium and coordinate all scheduled talks, including student talks. Be in charge of any library issues. Be in charge of any undergraduate research issues. Schedule a colloquium: Research Projects for Undergraduate Students.

Scholarships/Awards:

Administer Department application process by which students can express their need for a scholarship. Make scholarship recommendations based on need, GPA, and match with the scholarship criteria. Make recommendations for the annual student awards. The awards to be presented in the annual College of Science Awards meeting. Chair is on College of Science Honors/Awards/Scholarships Committee.

Assessment/Planning

Work on designing a Masters Degree in Math Teaching. **Action Item: Help with Program Review**

Appendix J – Course Rotation and Enrolment Data by Area

a. Courses offered over the past three plus years:

Math 1030	Contemporary Mathematics
Math 1040	Introduction to Statistics
Math 1050	College Algebra
Math 1060	Trigonometry
Math 1080	Pre-calculus
Math 1200	Mathematics Computer Laboratory
Math 1630	Discrete Mathematics Applied to Computing
Math 1210	Calculus I
Math 1220	Calculus II
Math 2210	Calculus III
Math 2410	Foundations of Probability and Statistics
Math 2250	Linear Algebra and Differential Equations
Math 2270	Elementary Linear Algebra
Math 2280	Ordinary Differential Equations
Math 2120	Euclidean Geometry
Math 3050	History of Mathematics
Math 3110	Foundations of Algebra (Formerly 2110)
Math 3120	Foundations of Euclidean and Non-Euclidean Geometry
Math 3160	Number Theory
Math 3270	Dynamical Systems (Formerly 3750)
Math 3280	Linear Algebra (Formerly 3350)
Math 3410	Probability and Statistics I
Math 3420	Probability and Statistics II
Math 3550	Introduction to Mathematical Modeling
Math 3610	Graph Theory
Math 3620	Enumeration
Math 3710	Boundary Value Problems
Math 3810	Complex Variables
Math 4110	Modern Algebra I
Math 4120	Modern Algebra II
Math 4210	Introductory Real Analysis I
Math 4220	Introductory Real Analysis II
Math 4320	Topology
Math 4610	Numerical Analysis
Math 4620	Numerical Analysis
Math 4710	Partial Differential Equations (Formerly 3730)
Math 4750	Topics in Mathematics
Math 4910	Senior Research Project
Math 2010	Mathematics for Elementary Teachers
Math 2020	Mathematics for Elementary Teachers
MTHE 3010	Methods and Technology for Teaching Secondary Mathematics

MTHE 4010 Capstone Mathematics for High School Teachers I
MTHE 4020 Capstone Mathematics for High School Teachers II
MTHE 3060 Probability and Statistics for Elementary Teachers
MTHE 3070 Geometry for Elementary Teachers
MTHE 3080 Number Theory for Elementary Teachers
MTHE 4040 Mathematical Problem Solving for Elementary Teachers
MTHE 4700 Senior Project in Elementary Math Teaching

b.Course Rotation for past three (plus) years:

Course numbers are listed along with the **number of sections** offered each semester.

	2009-2010			2010-2011			2011-2012			2012	
Course	Sum	Fall	Spr	Sum	Fall	Spr	Sum	Fall	Spr	Sum	Fall
MATH 1030	3	8	8	4	7	6	3	7	6	3	5
MATH 1040	1	2	2	1	3	3	1	3	4	2	4
MATH 1050	10	25	20	8	25	21	8	25	22	7	24
MATH 1060	3	6	5	3	6	6	2	6	5	3	5
MATH 1080	2	5	5	2	5	6	2	6	7	2	7
MATH 1200	1	3	2	1	1	1	1	1	2	1	2
MATH 1630	1	2	1	1	2	2	1	2	3	1	1
MATH 1210	1	7	6	2	7	6	2	7	6	2	7
MATH 1220	1	3	5	1	3	5	1	4	5	1	4
MATH 2120		1			1			1			1
MATH 2210	1	1	1	1	2	1	1	1	1	1	1
MATH 2250			1			1			1		
MATH 2270	1	1	1	1	1	1	1	1	1	1	1
MATH 2280		1	1		2	1		1	1		2
MATH 2410			1								
MATH 3050		1			1						
MATH 2110 or 3110		1				1 r			1		
MATH 3120			1			1			1		
MATH 3160			1			1			1		
MATH 3350 or 3270						1					
MATH 3750 or 3280			1						1		
MATH 3410		1			1			1	1		1
MATH 3420			1			1			1		
MATH 3550					1						1
MATH 3610								1			
MATH 3620									1		
MATH 3710		1			1			1			1
MATH 3810		1						1			
MATH 4110		1						1			

MATH 4120			1						1		
MATH 4210	1	1			1	1 a		1			1
MATH 4220						1					
MATH 4320			1						1		
MATH 4610					1						1
MATH 4620						1					
MATH 3730 or 4710						1					
MATH 4750											2
MATH 4910					1		2	1	1		2
MATH 2010	1	3	1	1	3	1		3	1	1	3
MATH 2020	1	1	3	1	1	3		1	3	1	1
MTHE 3010			1 a			1			1		
MTHE 3060			1 a			1 a			1 a		
MTHE 3070		1			1			1			1
MTHE 3080		1			1			1			1
MTHE 4010			1					1 a			1
MTHE 4020		1									
MTHE 4040			1			1			1		
MTHE 4700		1	1					1			
MTHE 6740					2						1
MTHE 6750								2			
MTHE 6760										2	
MTHE 6770											
MTHE 6780						2					1

Notes: MTHE 6740-6780 are courses for in service teachers; taught off campus in the public schools;
r- indicates a reading course taught by faculty on unpaid overload for one to three students;
a-indicates upper level course taught by adjunct

c. Enrollment Data (3rd week) by area for the past 4 years

Summary of Annual Report Data

The data below show enrollment:

- In QL courses increased about 300 (10%) from 2008 through 2011 but has gone down from the high in 2010/2011 by 150 which may be due to prerequisite expiration enforcements.

- In Calculus 1 and 2 increased by about 100.

- In Calculus III and post calculus lower level increased by about 100.
- In upper level math increased by about 100.
- In Math Ed and Elementary remained flat.

3rd Week enrollment data					
QL	1030, 1040, 1050 1080	2008-2009	2009-2010	2010-2011	2011-2012
	sections	95	91	91	94
	enroll	2690	2714	3009	2865
	SCH	10465	10578	11748	11092
Below calculus, includes QL	1030, 1040, 1050, 1060, 1080, 1630	2008-2009	2009-2010	2010-2011	2011-2012
	sections	115	109	111	113
	enroll	3183	3205	3565	3396
	SCH	12046	12139	13546	12825
	Enroll/section	27.67	29.40	32.12	30.05
Calculus	calculus I,II, 1200, 1210, 1220	2008-2009	2009-2010	2010-2011	2011-2012
	sections	27	29	27	29
	enroll	664	676	752	769
	SCH	2575	2569	2870	2935
	Enroll/section	24.59	23.31	27.85	26.52
Lower Post Calculus	post Calc 2210, 2250, 2270, 2280	2008-2009	2009-2010	2010-2011	2011-2012
	sections	9	10	11	9
	enroll	152	225	257	266
	enroll/section	16.88888889	22.5	23.36363636	29.5555556
	SCH	538	790	900	913
Upper Level Math	above 3000	2008-2009	2009-2010	2010-2011	2011-2012
	sections	13	13	15	18
	enroll	111	122	174	217
	SCH	333	366	522	651
MTHE	Math Ed and Math for Elementary Ed	2008-2009	2009-2010	2010-2011	2011-2012
	sections	17	19	18	16
	enroll	331	384	329	303

	SCH	993	1152	987	909
	TOTAL Enrollment	2008-2009	2009-2010	2010-2011	2011-2012
	sections	185	185	189	191
	enroll	4493	4665	5180	5025
	SCH	16593	17175	19134	18455

Appendix K Journal and Data Base Library Resources				
*Society For Industrial & Applied Mathematics Academic Membership Option D	SIAM	JK		
American mathematical monthly	Mathematical Association of America	JK	QA	Print & Online
College mathematics journal	Mathematical Association of America	JK	QA	Print - cw/online
Computer - IEEE Computer Society Digital Package - Order direct from IEEE	IEEE Computer Society.	JK	TK	Online
Computing in science and engineering - IEEE Computer Society Digital Package	American Institute of Physics	JK	QA761	Online
Educational studies in mathematics	Springer	SJ, JK	QA	Online
IEEE computer graphics and applications - IEEE Package	Institute Elec & Elec Engineers	JK	QA761	Print
IEEE multimedia - IEEE Package	Institute Elec & Elec Engineers	JK	QA761	Online
IEEE network - IEEE Package	Institute Elec & Elec Engineers	JK	TK	Online
IEEE software - IEEE Package	Institute Elec & Elec Engineers	JK	QA761	Online
IEEE spectrum	Institute Elec & Elec Engineers	JK	TK	Print - cw/online
IEEE transactions on communications - IEEE Package	Institute Elec & Elec Engineers	JK	TK	Print
IEEE transactions on computers - IEEE Package	Institute Elec & Elec Engineers	JK	TK	Online
IEEE transactions on pattern analysis and machine - IEEE Package	Institute Elec & Elec Engineers	JK	Q	Online
IEEE transactions on software engineering - IEEE Package	Institute Elec & Elec Engineers	JK	QA761	Online
IMA journal of numerical analysis	OXFORD UNIVERSITY PRESS	JK	QA	Online
International journal of mathematical education in science & technology	Taylor and Francis	JK	QA	Print - cw/online
Journal for research in mathematics education	National Council of Teachers Math	SJ, JK	QA	Online
Journal of recreational mathematics	Baywood Publishing Co. Inc.	JK	QA	Print
Mathematical intelligencer	Springer	JK	QA	Print - cw/online
Mathematics and computer education	Mathematics and computer education	JK	QA	Print
Mathematics magazine	Mathematical Association of America	JK	QA	Print - cw/online
Mathematics teacher - Includes Membership, News Bulletin, National Council of Teachers in Mathematics Membership	National Council of Teachers Math	SJ, JK	L	Print
Mathematics teaching in the middle school	National Council of Teachers Math	SJ, JK	L	Print
Rocky Mountain journal of mathematics	Rocky Mountain Math Consortium	JK	QA	Print & Online
SIAM journal on applied mathematics	Society for Industrial and Applied Mathematics	JK	QA	Online
SIAM journal on control and optimization	Society for Industrial and Applied Mathematics	JK	QA	Online
SIAM journal on discrete mathematics	Society for Industrial and Applied Mathematics	JK	QA	Online
SIAM journal on mathematical analysis	Society for Industrial and Applied Mathematics	JK	QA	Online
SIAM journal on matrix analysis and applications:	Society for Industrial and Applied Mathematics	JK	QA	Online
SIAM journal on numerical analysis	Society for Industrial and Applied Mathematics	JK	QA	Online
SIAM journal on optimization	Society for Industrial and Applied Mathematics	JK	QA	Online
SIAM news	Society for Industrial and Applied Mathematics	JK	QA	Online
SIAM review	Society for Industrial and Applied Mathematics	JK	QA	Online
SIAM theory of probability and its applications	Society for Industrial and Applied Mathematics	JK	QA	Online
Theory of Probability & Its Applications - Comes With Society for Industrial & Applied Mathematics - Option D	Society for Industrial and Applied Mathematics	JK	QA	Online
UMAP journal - Comes With Consortium for Mathematics & its applications membership	COMAP Inc	JK	QA	Print
UMAP modules (GNCL)	Consortium for Mathematics and Its Applicati	JK		Print