

# Department of Mathematics

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## Faculty

*Professors:* Mikhail Bouniaev; *Associate Professors:* Seth Armstrong, Saïd Bahi, Eric Freden, Martha Ann "Marty" Larkin, Andreas Weingartner; *Assistant Professors:* Jim Brandt, Sarah Brown, Jianlong Han, Derek Hein, Gretchen Rimmasch, Chunlei Zhang; *Lecturer:* Cecilia Weingartner

## DEGREES OFFERED

### Bachelor of Science

Mathematics, Actuarial Science Emphasis  
Mathematics, Bioinformatics Emphasis  
Mathematics, Education Emphasis  
Mathematics, Pure Mathematics Emphasis

### Minor

Mathematics, Pure Mathematics Emphasis  
Mathematics, Actuarial Science Emphasis  
Mathematics Education

## DEPARTMENT STATEMENT

We understand that a rich and appropriate mathematics education is needed by all disciplines at Southern Utah University. Not only do we serve future mathematicians, scientists, business strategists and engineers but also future teachers of mathematics as well as those pursuing studies in the arts and humanities. Except for reading, no other skill is so universally needed across the entire breadth of our society as those that our department is responsible to teach.

The department of mathematics is committed to offering a well-rounded academic program that will enhance the lives of both the casual observer of our discipline and the most serious minded science students. The demand for knowledge we offer is enormous in both industry and education. In secondary schools the two greatest shortages of qualified teachers across the nation are in mathematics and technology. This provides us with a great opportunity to serve both our students and the nation, and we feel that it is our mission to do so.

## GOALS

The department of mathematics has five specific areas of responsibility. They are:

1. General Education
2. Service courses for other departments
3. Preparing mathematics teachers for secondary schools
4. Preparing our majors for employment in industry
5. Preparing our majors for graduate school

## OBJECTIVES

1. To offer sufficient general education courses, both in numbers of sections and in levels of proficiency expected, to accommodate the demands placed on us by student needs, student abilities, and student interests.
2. To advise students into general education courses that will be both meaningful and manageable with the abilities and background that they have.
3. To offer mathematical instruction that is needed and requested by the major departments we serve.
4. To prepare our mathematics education majors with both the mathematical knowledge and the teaching skills necessary for successful teaching careers in secondary schools.
5. To prepare our majors for successful careers after graduation.
6. To prepare our majors for successful admission into graduate schools.
7. To recruit more quality students to the university and into our department.
8. To increase our retention rate of majors and ratio of upper division students.
9. To increase the effectiveness of our teaching.

## IMPLEMENTATION & ASSESSMENT

1. We offer courses that range from college mathematics, requiring essentially no background, to courses that the most advanced entering students can find challenging, and offer them frequently enough and with enough sections that students need not be turned away from courses they need. All of our general education courses are offered every semester. While our general education and service courses are very standard compared to the same courses at other universities and use "mainstream" textbooks, we are committed to make them the best we can, so we have begun reviewing every course - its content, objectives, and assessments. If a course cannot be justified it will be deleted. If its content cannot be justified, it will be changed.

2. Students with Math ACT scores below thirteen (13) and/or older than two (2) years must take a Math placement exam and must follow the placement. Students with Math ACT scores higher than thirteen (13) can choose to take the Liberal Arts Track or the Computational Track (see page 199). It is required that students with no math ACT score or scores that are two (2) years or older take the placement exam.

3. Specific content requests are made by departments of business, education, and engineering for the service courses we teach to their majors. We honor those requests. We also keep abreast of that which is being done in those courses at other universities across the country to make certain that our courses are in line with that which is being done elsewhere.

4. We require all of the state (level 4 mathematics endorsement requirements for the state of Utah) and nationally (National Council of Teachers of Mathematics "Standards for Teaching Mathematics") recommended subject matter and math courses of our mathematics education majors. The mathematical knowledge is assessed through classroom testing and exit exam. Teaching effectiveness is assessed through observations and evaluations of a cooperation teacher in

the secondary schools, a supervising mathematics professor, and a supervising education professor.

The exit exam and the student teacher evaluations are a permanent part of the students' files.

5. We require our majors to acquire skills that will make them employable upon graduation. We also require that they can demonstrate those skills on in-class assessments and also on a comprehensive examination before graduation. As is with the mathematics education majors, these will be kept in the students' files.

6. We require courses of our majors that are basic courses necessary to prepare them to do well on the GRE and to be able to enter graduate level courses and succeed in them. We gather data on the success rates of former students who have chosen this option, to ask for their input and recommendations for improving that preparation, and to use this information to improve our program. Specific data we keep includes: GRE scores of our graduates who take the exam, a record of those who do enter graduate school and of those who complete graduate degrees, and a file containing questionnaires that will be sent to former graduates asking for their evaluation of the education we have provided them.

7. Mathematics—provides such vast career opportunities that recruitment into these areas is just a matter of informing and educating people. Recruiting them to the university can be more difficult because most colleges and universities offer majors in this area. We improve our effectiveness in this endeavor by having representatives at high school science fairs and career days, by sponsoring fairs and contests on our campus, and by directly approaching students, such as the sterling scholars identified by each high school in the area, who have already been chosen as gifted in mathematics and technology. To assess our effectiveness in this area we 1) keep a record of our faculty participation in such events, 2) ask each of our new majors each year to identify their reason for coming to SUU and particularly for majoring in mathematics and 3) keep track of the number of students that we have acquired as a result of our recruiting efforts. This can assist us in identifying the areas where we can make the best use of our resources.

8. We improve in this area by identifying our majors early, staying close to them by assigning each a faculty mentor in our department and being aware of their future plans and needs. When a student informs us of plans to leave the university the advisor will interview the student to determine the cause. A record is kept of reasons for students leaving college or transferring to another college or university. This helps us identify weaknesses in our own program. We also make certain that most of our courses are typical of that which is being done at other universities across the country. This facilitates transfer of students from other colleges and universities and recruitment of upper division students.

9. We are constantly trying to improve teaching. Teacher evaluations are given each year, and are used to identify areas where improvement is needed. These areas are reviewed in an annual stewardship interview with the department chair, and plans and commitments are made for necessary changes. Sufficient time is given for those changes to be made and differences in the evaluations will be looked for the following year. This is done in a spirit of assistance rather than threat or intimidation.

**Remedial Math**

MATH 0900 Pre-Algebra and MATH 0990 Beginning Algebra are offered through the Student Success Center. Students with questions about these classes can contact Development Math Coordinator, Susan Tait at (435) 586-5441, or in her office in the Sharwan Smith Center room 178B, or at [peterson\\_s@suu.edu](mailto:peterson_s@suu.edu).

**LIBERAL ARTS TRACK:**

**Math Track for General Education and programs not requiring MATH 1040 or above:**

Students who do not have math requirements in their major or minor should take MATH 1030 to fulfill their general education quantitative literacy requirement. MATH 1020 or equivalent is a required prerequisite\* for students with ACT Math score below 23.\*\* See flowchart below.

**COMPUTATIONAL TRACK:**

**Math Track for programs requiring MATH 1040 or above:**

Students who have math requirements as part of their major or minor should take the math classes required by their program. These requirements vary but must include a minimum of one class numbered MATH 1040 or higher to meet the general education quantitative literacy requirement. Students who have ACT Math scores below 23\* must meet the following prerequisites.\* See flowchart

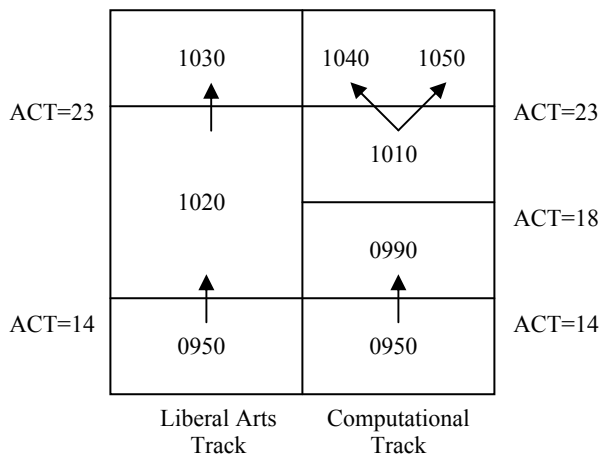
Students with an ACT Math score below 18\*\* must have MATH 0990 or equivalent and then MATH 1010 before taking additional math courses as required by the student's area of study. This will include a minimum of one class numbered MATH 1040 or higher to meet the general education quantitative literacy requirement.

Students with an ACT Math score from 18 to 22 inclusive must have MATH 1010 or equivalent before taking additional math courses as required by the student's area of study. This must include a minimum of one class numbered MATH 1040 or higher to meet the general education quantitative literacy requirement.

\*Students without ACT Math scores or students who would like to challenge their math placement may take the Math Placement Test.

\*\*Students with an ACT Math score of 13 or below will need developmental math courses and will take the math placement exam to determine which class to begin with.

Any student who has not taken the math placement test within the last two (2) years or whose prerequisite course is older than two (2) years must take the math placement test. Students that are unsure of their preparedness for any general education math class or any student who wishes to retake the exam may do so by contacting the Student Success Center, (435) 586-5419.



**B.S. in Mathematics, Emphasis in Pure Mathematics**

Recommended for students preparing for advanced studies in mathematics or employment in industry or business.

**B.S. in Mathematics, Emphasis in Actuarial Science**

Recommended for students preparing for careers as actuaries, a profession in demand by insurance and investment firms, banks, and government.

**B.S. in Mathematics, Emphasis in Bioinformatics**

Recommended for students desiring to obtain a graduate degree in Bioinformatics or related fields. Also for students directly entering the workforce in the areas of biotech, pharmaceutical, biostatistics and related industries. Completion of courses listed under the Biology Requirement and the Chemistry Requirement qualify for a Biology Minor.

**B.S. in Mathematics, Emphasis in Education**

Recommended for students preparing to teach mathematics at the high school level. (Satisfies the requirement for the Utah State Board of Education Level IV Endorsement in mathematics.) There are also a number of school wide requirements listed in the catalog.

**SUMMARY OF FIELDS OF STUDY**

All courses to be counted in the major and minor (Mathematics and Mathematics Education)—must be passed with a “C” or better. Students must take an approved comprehensive examination in mathematics, or mathematics education during their senior year, passing with a score at least in the 25<sup>th</sup> percentile.

**DEGREE REQUIREMENTS**

<b>Mathematics Emphasis in Pure Mathematics Bachelor of Science</b>	
<b>Course Number and Title</b>	<b>Credits</b>
<b>General Education Core (see Chapter 14)</b>	
Core Course Requirements (must take MATH 1210)	17-18
Knowledge Areas Requirements (must take PHYS 2210/2215)	19
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Program Prerequisites (7 hours)</b>	
MATH 1050 College Algebra (prerequisite for Math 1210 Calculus I)	4
MATH 1060 Trigonometry (prerequisite for Math 1210 Calculus I)	3
<b>Core Requirements (51 hours)</b>	
MATH 1220 Calculus II	4
MATH 1630 Discrete Math	3
MATH 2210 Calculus III	4
MATH 2270 Linear Algebra	3
MATH 2280 Differential Equations	3
MATH 3120 Foundation of Algebra & Analysis	3
MATH 3700 Probability & Statistics	5
MATH 4220 Abstract Algebra	4
MATH 4400 Advanced Calculus I	4
MATH 4410 Advanced Calculus II	3

MATH 4580 Complex Analysis	3
MATH 4990 Capstone Seminar	3
<b>One of the following:</b> CSIS 1400 Fundamentals of Programming (3) CSIS 1410 Object Oriented Programming (3)	3
Electives CSIS 4550 or any upper division math courses (3000-4000 level), except Math 3140 or Math 4900	6
<b>Other Electives</b>	
Free Electives (minor not required)	25
<b>Total Credits, B.S. degree</b>	<b>120</b>

<b>Mathematics Emphasis in Actuarial Science Bachelor of Science</b>	
<b>Course Number and Title</b>	<b>Credits</b>
<b>General Education Core (see Chapter 14)</b>	
Core Course Requirements (must take MATH 1210)	17-18
Knowledge Area Requirements—must take ECON 2010	19
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Support Core Requirements (3 hours)</b>	
ECON 2020 Principles of Macroeconomics	3
<b>Program Prerequisites (7 hours)</b>	
MATH 1050 College Algebra (prerequisite for Math 1210)	4
MATH 1060 Trigonometry (prerequisite for Math 1210)	3
<b>Core Requirement (57 hours)</b>	
MATH 1220 Calculus II	4
MATH 1630 Discrete Math	3
MATH 2210 Calculus III	4
MATH 2270 Linear Algebra	3
MATH 2280 Differential Equations	3
MATH 3120 Foundations of Algebra & Analysis	3
MATH 3500 Actuarial Mathematics	3
MATH 3700 Probability & Statistics	5
MATH 3770 Mathematical Models	3
MATH 4220 Abstract Algebra	4
MATH 4400 Advanced Calculus I	4
MATH 4990 Capstone Seminar	3
<b>One of the following:</b> CSIS 1400 Fundamentals of Programming (3) CSIS 1410 Object Oriented Programming (3)	3
ACCT 2010 Accounting Principles	3
FIN 3250 Managerial Finance I	3
FIN 3260 Managerial Finance II	3
ECON 4260 Econometrics <i>Requires instructors signature</i>	3
<b>Other Electives</b>	
Free Electives (minor not required)	13
<b>Total Credits, B.S. degree</b>	<b>120</b>

<b>Mathematics Emphasis in Bioinformatics Bachelor of Science</b>	
Course Number and Title	Credits
<b>General Education Core (see Chapter 14)</b>	
Core Course Requirements (must take MATH 1210)	17-18
Knowledge Areas Requirements (must take BIOL 1610/1615, & CHEM 1210/1215)	19
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Program Prerequisites (7 hours)</b>	
MATH 1050 College Algebra (prerequisite for Math 1210)	4
MATH 1060 Trigonometry (prerequisite for Math 1210)	3
<b>Math Requirement (43 hours)</b>	
MATH 1220 Calculus II	4
MATH 1630 Discrete Math	3
MATH 2210 Calculus III	4
MATH 2270 Linear Algebra	3
MATH 2280 Differential Equations	3
MATH 3120 Foundations of Algebra & Analysis	3
MATH 3600 Numerical Analysis	3
MATH 3700 Probability & Statistics	5
MATH 3800 PDEs and Fourier Analysis	4
MATH 3994 Undergraduate Research	4
MATH 4890 Internship	7
<b>Computer Science Requirement (6 hours)</b>	
CSIS 1400 Fundamentals of Programming	3
CSIS 1410 Object Oriented Programming	3
<b>Biology Requirement (16 hours)</b>	
BIOL 1620 General Biology & Lab (BIOL 1625)	4
BIOL 3030 Ecology & Lab (BIOL 3035)	4
BIOL 3060 Genetics & Lab (BIOL 3070)	4
BIOL 3110 Evolution	3
BIOL 4990 Seminar	1
Biology Minor	
BIOL 1610/1615      BIOL 1620/1625	
BIOL 3030/3040      BIOL 3060/3070	
BIOL 3110              BIOL 4990	
<b>Chemistry Requirement (19 hours)</b>	
CHEM 1220/1225 Principles of Chemistry II & Lab	5
CHEM 2310 Organic Chemistry I	4
CHEM 2320/2325 Organic Chemistry II & Lab	6
CHEM 4110 Biochemistry I	4
<b>Total Credits, B.S. degree</b>	<b>127</b>

<b>Mathematics Emphasis in Education Bachelor of Science</b>	
Course Number and Title	Credits
<b>General Education Core (see Chapter 14)</b>	
Core Course Requirements (must take MATH 1210)	17-18
Knowledge Areas Requirements	19
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Program Prerequisites (7 hours)</b>	
MATH 1050 College Algebra (prerequisite for Math 1210)	4
MATH 1060 Trigonometry (prerequisite for Math 1210)	3
<b>Core Requirements (41 hours)</b>	
MATH 1220 Calculus II	4
MATH 1630 Discrete Math	3
MATH 2210 Calculus III	4
MATH 2270 Linear Algebra	3
MATH 2280 Differential Equations	3
MATH 3120 Foundations of Algebra & Analysis	3
MATH 3130 Foundations of Geometry	3
MATH 3700 Probability & Statistics	5
MATH 4220 Abstract Algebra	4
MATH 4400 Advanced Calculus I	3
MATH 4900 Methods of Teaching Secondary School Mathematics	3
Elective (any upper division math course)	3
<b>Other Electives (36 hours)</b>	
Free Electives (includes licensure requirements, minor not required)	36
<b>Total Credits, B.S. degree with licensure</b>	<b>120</b>

<b>Mathematics Minor Emphasis in Pure Mathematics</b>	
Course Number and Title	Credits
<b>Required Courses (19 hours)</b>	
MATH 1220 Calculus II	4
MATH 1630 Discrete Math	3
MATH 2210 Calculus III	4
MATH 2270 Linear Algebra	3
MATH 3700 Probability and Statistics	5
<b>Total Credits</b>	<b>19</b>

<b>Mathematics Minor Emphasis in Actuarial Science</b>	
<b>Course Number and Title</b>	<b>Credits</b>
<b>Required Courses (22 hours)</b>	
MATH 1220 Calculus II	4
MATH 2210 Calculus III	4
MATH 2270 Linear Algebra	3
MATH 3500 Actuarial Mathematics	3
MATH 3700 Probability & Statistics	5
MATH 3770 Mathematical Models	3
<b>Total Credits</b>	<b>22</b>

<b>Mathematics Minor Emphasis in Education</b>	
<b>Course Number and Title</b>	<b>Credits</b>
<b>Required Courses (24 hours)</b>	
MATH 1220 Calculus II	4
MATH 1630 Discrete Mathematics	3
MATH 2270 Linear Algebra	3
MATH 3120 Foundations of Algebra & Analysis	3
MATH 3130 Foundations of Geometry	3
MATH 3700 Probability & Statistics	5
MATH 4900 Methods of Teaching Secondary School Mathematics	3
<b>Total Credits</b>	<b>24</b>

### Secondary Education Requirements for Licensure (34-37 Hours)

Please see page 178 for the degree requirements for Secondary Education Licensure. Some classes required for the licensure cannot be taken until the teacher candidate has been admitted to the Teacher Education Department. Please consult your advisor or the Teacher Education Department for further instruction.



