California State University Channel Islands

Program Update

For Minor Program Updates Only

Program updates must be submitted by November 2, 2009 for priority catalog review

Date 10/28/09; rev 12.7.09
Program Area: MATHEMATICS
Semester/Year first affected: Fall 2010

Instructions: Please use this Program Update form for minor changes to existing programs. Appropriate updates for this form include faculty or address changes, additions of approved electives, minor editing for clarity, and other minor updates. Any change to program requirements, units, outcomes, emphases or options, or other programmatic concerns require the standard two column Program Modification form, available at the Curriculum website.

CURRENTLY APPROVED PROGRAM WITH CHANGES TRACKED

Paste the latest approved version of your entire program in the below the line and before the Summary of Changes before you begin (If you are unsure about which version is the most recent, contact Kathy Musashi). If the form does not preset to the tracked changes mode, turn on tracked changes using Word Tools before making the necessary edits. Please set the view to ORIGINAL SHOWING MARKUP.

SUMMARY OF CHANGES (Mark applicable change box below)

_x_ Adding elective courses
___x Updating faculty or addresses
___ Minor editing for clarity
_x_ Other, Please briefly explain Slight alteration of the requirement regarding Core courses in the MS Math program: currently students must choose three Core courses from a list of 6. The list includes graduate computer science and physics courses. Now we will require that at least two of the three core courses be Mathematics courses, which improves the quality and legitimacy of the degree program.

Mathematics
Programs Offered

- Bachelor of Science in Mathematics
- Minor in Foundational Mathematics
- Minor in Mathematics
- Master of Science in Mathematics

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- Approved CCTC Mathematics Subject Matter Waiver Program

Mathematics can be pursued as a scholarly discipline of an especially elegant and creative art form or it can be treated as a valuable tool in an applied discipline. Our program addresses both needs. Students will be given a strong background in mathematics and statistics as well as a substantial amount of interdisciplinary applications in Physics, Biostatistics, Business, Computer and Information Sciences, Computer Imagining or Artificial Intelligence.

Careers

The mathematics major will prepare students for teaching careers, studies in graduate programs (in pure mathematics, applied mathematics, mathematics education, or the mathematical sciences) or for employment in high-tech and bio-tech industries, where mathematics-trained professionals with interdisciplinary expertise (sciences and business) are increasingly sought after.

Program Learning Outcomes

Students graduating from the Mathematics program will be able to:

- Demonstrate critical thinking, problem solving skills and ability to use advanced mathematical methods by identifying, evaluating, classifying, analyzing, and synthesizing data and abstract ideas in various contexts and situations;
- Demonstrate the knowledge of current mathematical applications, computing practices and use of broad technology in industry, science and education;
- Demonstrate ability to use modern software, abstract thinking, and mathematical practices connected to scientific and industrial problems, and demonstrate these skills that are currently used by technologies in society and education;
- Perform skills that enable them to evaluate, propose and convey novel solutions to scientific and business problems, etc.;
- Demonstrate cooperation skills by working effectively with others in interdisciplinary group-settings - both inside and outside the classroom; and
- Demonstrate a sense of exploration that enables students to pursue lifelong learning and currency in their careers in mathematics, statistics, education, high-tech and bio-tech industries.

Faculty

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Associate Professor of Mathematics

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MS in Mathematics Graduate Program Director
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Contact Information

http://math.csuci.edu

Bachelor of Science in Mathematics - (120 units)

Lower Division Required Major Courses	34-35
Upper Division Required Major Courses	20
Upper Division Elective & Emphasis Major Courses	15-19
Electives	16
GE Included in Major Requirements	18
GE and American Institutions Requirement	34
TOTAL	**120**

Lower Division Requirements
34 - 35 units

MATH	150	Calculus I	4
MATH	151	Calculus II	4
MATH	230	Logic and Mathematical Reasoning	3
MATH	240	Linear Algebra	3
MATH	250	Calculus III	3
PHYS 200		General Physics I	4

Select one of the following:

PHYS 201 **and** one additional science course 7-8
One two-semester science sequence 7-8

or

One two-semester science sequence 7-8

Select one of the following:

COMP 105 Computer Programming Introduction 3

COMP 150 Object-Oriented Programming.....4

Select an additional Computer Science course:
COMP150 **or** above or COMP 102 3-4

Upper Division Requirements - 20 units

MATH	300	..... Discrete Mathematics	3
MATH	331	..... History of Mathematics	3
MATH	350	.....Differential Equations and Dynamical Systems 3	
MATH	351	..... Real Analysis	3
MATH	352	.....Probability and Statistics	3
MATH	451	..... Complex Analysis	3
MATH	499	.....Senior Colloquium *(twice)*	1

Electives in Major - 9 - 13 units

Note:

1. Courses used for the emphases cannot be counted as elective.
2. Students planning on teaching math have to choose MATH 492 for field experience requirement. Other courses recommended for teaching careers are marked with T.

MATH	318	.....Mathematics for Secondary School Teachers ..... 3 - T	
MATH	330	.....Mathematics and Fine Arts	3 - T
MATH	345	Digital Image Processing (COMP/PHYS)	3
MATH	354	.....Analysis of Algorithms	3
MATH	393	..... Abstract Algebra1	3 -T
MATH	428	.....Philosophy of Mathematics	3
MATH	429	.....Operations Research	3
MATH	430	Research Design and Data Analysis	3
MATH	437	Mathematics for Game Development	3
MATH	445	.....Image Analysis and Pattern Recognition (COMP/PHYS).....3	
MATH	448	..... Scientific Computing	3
MATH	450	.... Partial Differential Equations and Mathematical Physics 3	
MATH	452	Computational Bioinformatics (COMP)	4
MATH	480	Differential & Riemannian Geometry	3
MATH	482	..Number Theory and Cryptography	3 - T

Kathy: with "track changes" on, I couldn't tell whether I was fixing the formatting discrepancies here or making them worse. Please advise! Thanks, CW

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MATH 484 Algebraic Geometry and Coding Theory 3
MATH 490 Topics in Modern Mathematics.....3
MATH 492 Internship..... 3 - T - required
MATH 494 Independent Research..... 1-3
MATH 497 Directed Studies.....3
MATH 499 Senior Colloquium.....1

Required Supporting and Other GE Courses

GE and American Institutions Requirement .....34 units
Elective Courses..... 16 units

Select one interdisciplinary GE Course 3 units
Recommended:
COMP 447 Societal Issues in Computing 3
COMP 449 Human-Computer Interactions (PSY)....3
PHYS 434 Introduction to Biomedical Imaging (BIOL/HLTH) 4

Emphasis - 6 - 10 units

By the sophomore year, in order to plan their electives, students should decide on one of the following emphases and take all courses listed in the section.

Biomathematics - 10 units

Students selecting this emphasis should take BIOL 201
MATH 202 Biostatistics (PSY).....3
MATH 430 Research design and Data Analysis 3
MATH 452 Computational Bioinformatics (COMP) .4

Computer Science - 9 units

Students selecting this emphasis should take COMP 150 and COMP 151 for the computer science requirements
MATH 448 Scientific Computing 3
MATH 354 Analysis of Algorithms.....3
COMP 350 Introduction to Software Engineering 3

Physics - 6 units

Students selecting this emphasis should take PHYS 200 and 201(8) as the science sequence.
MATH 450 Partial Differential Equations and Mathematical Physics 3
Upper division Physics course 3

Applied Physics - 6 units

Students selecting this emphasis should take PHYS 200 and 201(8) as the science sequence

MATH	345	Digital Image Processing (COMP/PHYS)	3
MATH	445	Image Analysis and Pattern Recognition (COMP/PHYS)	3

Actuarial Sciences/Economics - 9 units

MATH	429	Operations Research	3
ECON	300	Fundamentals of Economics	3
ECON	486	Introduction to Econometrics	3

Business Management - 9 units

MATH	329	Statistics for Business and Economics	3
MATH	429	Operations Research	3
Economics or Upper Division Management Course			3

Cognitive Science - 9 units

MATH	430	Research Design and Data Analysis	3
PSY	210	Learning, Cognition and Development	3
Upper Division Cognitive Psychology Course			3

Education - 9 units

MATH	318	Mathematics for Secondary School Teachers	3
MATH	393	Abstract Algebra I	3
EDUC	512	Equity, Diversity and Foundations of Schooling	3

Applied Mathematics - 9 units

MATH	429	Operations Research	3
MATH	448	Scientific Computing	3
MATH	450	Partial Differential Equations and Mathematical Physics	3

Digital Design - 9 units

MATH	393	Abstract Algebra 1	3
ART	108	Visual Technologies	3

Select one of the following:

ART	312	Digital Media Art: Time-Based Imaging and Compositing	3
ART	314	Digital Media Art: Digital Photography	3

Choice of other emphases or individualized emphasis is possible upon approval of the mathematics advisor.

Proposed Course of Study

Freshman Year - 30 - 32 units

MATH	150	Calculus I GE B3	4
MATH	151	Calculus II	4
MATH	230	Logic and Mathematical Reasoning GE A3	3
MATH	399	Modern Tech in Math *(twice)*	1
PHYS	200	General Physics I GE B2	4
Computer Science Course			2-4
GE Section A, C, D, or E			3

Select one of the following:

COMP	105	Computer Programming Introduction GE B4	3-4
COMP	150	Object Oriented Programming GE B4	4

Select either (ENGL 102+103) or ENGL 105

ENGL	102	Stretch Composition I	3
ENGL	103	Stretch Composition II	3
or			
ENGL	105	Composition and Rhetoric GE A2	3

Sophomore Year - 22 - 23 units

MATH	240	Linear Algebra	3
MATH	250	Calculus III	3
MATH	300	Discrete Mathematics	3

MATH 350 Differential Equations and Dynamical Systems 3
MATH 399 Modern Tech in Math 1

Junior Year - 15 - 18 units + GE

MATH 331 History of Mathematics 3
GE B3, D, INTD
MATH 351 Real Analysis.....3
MATH 352 Probability and Statistics 3

Choose <u>one</u> of the groups from the Emphasis Courses listed above

Senior Year 14 - 15 units + GE

MATH 451 Complex Analysis.....3
MATH 499 Senior Colloquium.....1 Fall
MATH 499 Senior Colloquium.....1 Spring
Choose ***<u>three</u>*** or more Math Electives 9-12

Minor in Mathematics - (20 units)

MATH 150 Calculus I 4
MATH 151 Calculus II 4
MATH 300 Discrete Mathematics.....3

In addition, students should select three upper division courses
<u>9</u> units from the Mathematics program approved by the advisor. Approval is not required for Computer Science majors.

Minor in Foundational Mathematics - (34 - 36 units)

This minor meets the needs of non-mathematics majors intending to enter a middle school mathematics teaching credential program. Especially, many Liberal Studies students would like to teach upper level elementary mathematics.

Lower Division Requirements
15 - 16 units
(including pre-/co-requisites)

Choose one of the following:

MATH	101	College Algebra	3
MATH	105	Pre-Calculus	4
MATH	150	Calculus I	4

Choose one of the following:

MATH	201	Elementary Statistics	3
MATH	202	Biostatistics (PSY)	3

Additional required courses:

MATH	208	Modern Mathematics for Elementary Teaching I-Numbers and Problem Solving	3
MATH	230	Logic & Mathematical Reasoning	3
MATH	240	Linear Algebra	3

Upper Division Requirements - 16 units
(including pre-/co-requisites)

MATH	308	Modern Mathematics for Elementary School Teaching II-Geometry, Probability and Statistics	3
MATH	318	Mathematics for Secondary School Teachers (3-T)	3
MATH	330	Mathematics and Fine Arts	3
MATH	331	History of Mathematics	3
MATH	499	Senior Colloquium	1

Select one of the following:

MATH	492	Internship	1-3
LS	499	Capstone Project	1-3

Electives
Choose one course from the list below 3-4 units

MATH	150	Calculus I	4
MATH	151	Calculus II	4
MATH	300	Discrete Mathematics	3

MATH 393 Abstract Algebra I 3
MATH 482 Number Theory & Cryptography.....3
or
Other upper division math course 3-4 units

Master of Science in Mathematics - (32 units)

(Offered through CSU Channel Islands' Extended Education Program)

Our MS in Mathematics program is interdisciplinary and innovative in nature, and offers a flexible schedule with highly qualified faculty. It is designed to address the global need for people with advanced mathematical, computational, and computer skills throughout the industry, high-tech, and educational systems. Students will acquire a strong background in mathematics, and computer software, as well as the skills to conduct independent applied research or develop independent projects. The program will stress interdisciplinary applications, for example in Actuarial Sciences, Cryptography, Security, Image Recognition, Artificial Intelligence, and Mathematics Education, and will give students a valuable opportunity to gain teaching experience on the university level. Students' specializations depend on the final project/ thesis and the electives chosen under the supervision of a Mathematics advisor. An individual study plan can be designed to meet entry requirements for Ph.D. programs in Mathematical Sciences.

Admission Requirements

1. Application. Apply to both the University and the Mathematics Program. Forms are available at the Extended University Office and on-line at http://math.csuci.edu/.
2. Recommendation. At least two letters of recommendations from academia or professional supervisors.
3. Subject Matter Preparation. Applicants are expected to hold BS degree in mathematics. However students with other degrees (or equivalent coursework) maybe considered and admitted conditionally (subject to completing relevant undergraduate mathematics courses).
4. GPA of 3.0 in Mathematical Sciences. If applicant does not have the required GPA, conditional admission maybe available on a limited bases.
5. GRE (general and mathematics) scores are recommended, but not required.

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Contact :

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Requirements for the Master of Science in Mathematics - (32 units)

Core Courses - 11 units

Choose three courses from the following list. At least two courses must be in Mathematics.

MATH	510	Probabilistic Methods and Measure Theory	3
MATH	511	Functional Analysis	3
MATH	513	Advanced Algebra	3
COMP	510	Algorithms	3
COMP	569	Artificial Intelligence	3
PHYS	510	Advanced Image Analysis Techniques	3

And required two units of:

MATH	599	Graduate Seminar	1

Electives - 15 units*

Choose five electives from the following list (at least three courses in mathematics):

MATH	511	Functional Analysis	3
MATH	513	Advanced Algebra	3
MATH	555	Actuarial Sciences	3
MATH	565	Research in Mathematics Education	3
MATH	570	Combinatorics	3
MATH	581	Mathematical Methods in Artificial Intelligence (COMP)	3
MATH	582	Number Theory and Cryptography	3
MATH	584	Algebraic Geometry and Coding Theory	3
MATH	587	Markov Chains and Markov Processes	3
MATH	588	Stochastic Analysis	3
PHYS	546	Pattern Recognition	3
COMP	520	Advanced Database Systems	3
COMP	524	Security	3
COMP	529	Network Computing	3
COMP	549	Human-Computer Interaction	3
COMP	550	Advanced Software Engineering	3
COMP	569	Artificial Intelligence	3
COMP	571	Biologically Inspired Computing	3

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COMP 572 Neural Networks.....3
COMP 575 Multi-Agent Systems.....3
COMP 578 Data Mining.....3

*other graduate or junior/senior courses from related disciplines may be included with advisors approval.

Projects or Masters Thesis Emphasis - 6 units

MATH 597 Master Thesis 3
or
MATH 598 Master Project 3

Graduate Writing Assessment Requirement

Writing proficiency prior to the awarding of the degree is demonstrated by successful completion of at least two credits of MATH 597 (Masters Thesis) or MATH 598 (Masters Project) with a grade of B or higher.

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Cindy Wyels 9/25/09
Proposer of Program Modification Date

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APPROVAL SHEET

Program:

Program Chair		
	Signature	Date

Curriculum Chair		
	Signature	Date

Dean of Faculty		
	Signature	Date