PROGRAM MODIFICATION

PROGRAM AREA MATHEMATICS

Please use the following format to modify any existing program. Any deletions from an existing program need to be underlined (left hand column), and any additions/changes to the program need to be in CAPS (right hand column).

EXISTING PROGRAM	PROPOSED PROGRAM
Name of Degree Program	**Name of Degree Program**
MATHEMATICS	**MATHEMATICS**
PROGRAMS OFFERED • Bachelor of Science in Mathematics • Minor in Mathematics	**PROGRAMS OFFERED** • Bachelor of Science in Mathematics • Minor in Mathematics
Catalog Description of the Program	**Catalog Description of the 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, Computational Biochemistry, Biostatistics, Business, Computer and Information Sciences, Computer Imagining or Artificial Intelligence.	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, Computational Biochemistry, Biostatistics, Business, Computer and Information Sciences, Computer Imagining or Artificial Intelligence.
Requirements for the Bachelor of Science in Mathematics (120 units)	**Requirements for the Bachelor of Science in Mathematics (120 units)**

Lower Division Requirements (34-35 units):
MATH 150   Calculus I (4)
MATH 151   Calculus II (4)
MATH 230   Logic & Mathematical Reasoning (3)
MATH 250   Calculus III (3)
MATH 240   Linear Algebra (3)
COMP 150   Object Oriented Programming
                Or
COMP 105   Computer Programming Introduction (4)
Additional Computer Science course (2-4)
PHYS 200   General Physics I (4)
either PHYS 201 and one additional science course
or 2 semester science sequence in sciences (7-8)
	Lower Division Requirements (34-35 units):
	MATH 150 Calculus I (4)
	MATH 151 Calculus II (4)
	MATH 230 Logic & Mathematical Reasoning (3)
	MATH 250 Calculus III (3)
	MATH 240 Linear Algebra (3)
	COMP 150 Object Oriented Programming
	                Or
	COMP 105 Computer Programming Introduction (4)
	Additional Computer Science course (2-4)
	PHYS 200 General Physics I (4)
	either PHYS 201 and one additional science course
	or 2 semester science sequence in sciences (7-8)

Upper Division Requirements (19 units):
MATH 300   Discrete Mathematics (3)
MATH 350   Differential Equations and Dynamical
          Systems (3)
MATH 331   History of Mathematics (3)
MATH 352   Probability and Statistics (3)
MATH 351   Real Analysis (3)
MATH 452   Complex Analysis (3)
	Upper Division Requirements (19 units):
	MATH 300 Discrete Mathematics (3)
	MATH 350 Differential Equations and Dynamical
	          Systems (3)
	MATH 331 History of Mathematics (3)
	MATH 352 Probability and Statistics (3)
	MATH 351 Real Analysis (3)
	MATH 45**1** Complex Analysis (3)

MATH 499   Senior Colloquium (1)

Upper Division Interdisciplinary Courses
MATH 331   History of Mathematics (3, G.E. B3, D,
              Interdisciplinary)
MATH 430   Research design and Data Analysis
              (3, G.E. B1,B3, Interdisciplinary)
MATH 448   Scientific Computing (3, G.E. B3, B4,
              Interdisciplinary)

ELECTIVES IN MAJOR (<u>15-19 units</u>):
<u>By the sophomore year the student should decide on one of
the emphases listed in the Proposed Plan of Study (6-9)</u>

MATH 318   Mathematics for Secondary School Teachers (3)
MATH 354   Analysis of Algorithms (3)
MATH 393   Abstract Algebra (3)
MATH 430   Research Design and Data Analysis (3)
MATH 429   Operations Research (3)
MATH 450   Partial Differential Equations and
              Mathematical Physics (3)
MATH 448   Scientific Computing (3)
MATH 480   Differential and Riemaniann Geometry (3)
MATH 482   Number Theory and Cryptography (3)
MATH 484   Algebraic Geometry and Coding Theory (3)
MATH/PHYS 345   Digital Image Processing (3)
MATH/PHYS 445   Image Analysis and Pattern Recognition (3)
MATH 490   Topics in Mathematics (3)
MATH 492   Internship (3)
MATH 494   Independent Study (3)
MATH 497   Directed Study (3)
MATH 499   Senior Colloquium (1)

Required Supporting and other GE Courses
Elective Courses (<u>18</u>)
General Education and Title V (34)

<u>Emphasis or Option Requirements</u>

Additional Courses
MATH 454   Analysis of Algorithms (3)

PROPOSED COURSE OF STUDY

Freshman Year (30-32 units):
ENGL 105   Composition and Rhetoric (3,
G.E. A2)

MATH 499   Senior Colloquium (1)

Upper Division Interdisciplinary Courses
MATH 331   History of Mathematics (3, G.E. B3, D,
              Interdisciplinary)
MATH 430   Research design and Data Analysis
               (3, G.E. B1,B3, Interdisciplinary)
MATH 448   Scientific Computing (3, G.E. B3, B4,
              Interdisciplinary)

ELECTIVES IN MAJOR (9-13 UNITS):
NOTE: 1) COURSES USED FOR THE EMPHASIS CANNOT
BE COUNTED AS ELECTIVE. 2) STUDENTS PLANNING
ON TEANCHING 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 320   MATHEMATICS AND FINE ARTS (3 - T)
MATH 354   Analysis of Algorithms (3)
MATH 393   Abstract Algebra (3 -T)
MATH 430   Research Design and Data Analysis (3)
MATH 429   Operations Research (3)
MATH 450   Partial Differential Equations and
              Mathematical Physics (3)
MATH 448   Scientific Computing (3)
MATH 480   Differential and Riemaniann Geometry (3)
MATH 482   Number Theory and Cryptography (3 - T)
MATH 484   Algebraic Geometry and Coding Theory (3)
MATH/PHYS 345   Digital Image Processing (3)
MATH/PHYS 445   Image Analysis and Pattern Recognition (3)
MATH/COMP 452   COMPUTATIONAL
BIOINFORMATICS (3)
MATH 490   Topics in Mathematics (3)
MATH 492   Internship (3 – T - required)
MATH 494   Independent Study (3)
MATH 497   Directed Study (3)
MATH 499   Senior Colloquium (1)

Required Supporting and other GE Courses
Elective Courses (16)
General Education and Title V (34)

EMPHASIS (6-9)
BY THE SOPHOMORE YEAR THE STUDENT SHOULD
DECIDE ON ONE OF THE EMPHASIS LISTED IN THE
PROPOSED PLAN OF STUDY (BELOW). STUDENTS
PLANNING ON TEACHING MATHEMATICS HAVE TO
CHOOSE EDUCATION EMPHASIS TO MEET THE SINGLE
SUBJECT MATTER PREPARATION REQUIREMENTS.

Additional Courses
MATH 454   Analysis of Algorithms (3)

PROPOSED COURSE OF STUDY

Freshman Year (30-32 units):
ENGL 105   Composition and Rhetoric (3,

Or
ENG 102 and 103 (6)
MATH 150   Calculus I (4, G.E. B3)
COMP 150   Object Oriented
Programming
                   Or
COMP 105   Computer Programming
Introduction
                   (3-4, G.E. B4)
G.E. Section A, or C (3)
MATH 151   Calculus II (4)
MATH 230   Logic and Mathematical
Reasoning
                   (3, G.E. A3)
Computer Science Course (2-4)
PHYS 200   General Physics I (4, G.E.
B2)
G.E. Section A, C, D, or E (3)

Sophomore Year (22-23 Units):
MATH 250   Calculus III (3)
MATH 240   Linear Algebra (3)
MATH 300   Discrete Mathematics (3)
MATH 350   Differential Equations and
Dynamical Systems (3)
Select one interdisciplinary G.E. (3)
Recommended:
PHYS 434   Biomedical Imaging (3)
COMP 447   Societal Issues in Computing
(3)
COMP 449   Human Computer
Interactions (3)
Select either PHYS 201 and one additional science
course or 2 semester science sequence in sciences (
7-8, G.E. B1 and B2]

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

Biomathematics (6):
Students selecting this emphasis should take BIOL
201.
MATH 430   Research design and Data
Analysis
                   (3, G.E. B1,B3,
Interdisciplinary)
COMP 432   Computational

G.E. A2)
                   Or
ENG 102 and 103 (6)
MATH 150   Calculus I (4, G.E. B3)
COMP 150   Object Oriented
Programming
                   Or
COMP 105   Computer Programming
Introduction
                   (3-4, G.E. B4)
G.E. Section A, or C (3)
MATH 151   Calculus II (4)
MATH 230   Logic and Mathematical
Reasoning
                   (3, G.E. A3)
Computer Science Course (2-4)
PHYS 200   General Physics I (4, G.E.
B2)
G.E. Section A, C, D, or E (3)

Sophomore Year (22-23 Units):
MATH 250   Calculus III (3)
MATH 240   Linear Algebra (3)
MATH 300   Discrete Mathematics (3)
MATH 350   Differential Equations and
Dynamical Systems (3)
Select one interdisciplinary G.E. (3)
Recommended:
PHYS 434   Biomedical Imaging (3)
COMP 447   Societal Issues in Computing
(3)
COMP 449   Human Computer
Interactions (3)
Select either PHYS 201 and one additional science
course or 2 semester science sequence in sciences (
7-8, G.E. B1 and B2]

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

Biomathematics (6):
Students selecting this emphasis should take BIOL
201.
MATH 430   Research design and Data
Analysis
                   (3, G.E. B1,B3,
Interdisciplinary)

Bioinformatics (4)

Computer Science (9):
Students selecting this emphasis should take
COMP 150 and COMP 151 for the computer
science requirements
COMP 350   Software Engineering (3)
MATH 488   Scientific Computing (3, G.E.
B4,B3, Interdisciplinary))
MATH 454   Analysis of Algorithms (3)

Physics (6):
Students selecting this emphasis should take PHYS
200 and 201(8) as the science sequence.
MATH 350   Partial Differential Equations
and Mathematical Physics (3)
MATH 452 Complex Analysis

Applied Physics (6):
Students selecting this emphasis should take PHYS
200 and 201(8) as the science sequence.
COMP/PHYS 345   Digital Image Processing (3)
COMP/PHYS 445   Image Analysis and Pattern
Recognition (3)

Actuarial Sciences/Economics (9):
ECON 300   Fundamentals of Economics
(3, G.E. D)
ECON 486   Introduction to
Econometrics (3)
MATH 429   Operations Research (3)

Business Management (9):
ECON 300   Fundamentals of Economics
(3, G.E.D)
MATH 429   Operations Research (3)
Upper Division Management Course (3)

Cognitive Science (9):
MATH 430   Research Design and Data
Analysis (3)
PSY 210   Learning, Cognition and
Development
Upper Division Cognitive Psychology Course (3)

Education (9):
EDUC 520 Observing and Guiding behivior In
Maulticultural Classrooms

COMP 452   Computational
Bioinformatics (4)

Computer Science (9):
Students selecting this emphasis should take
COMP 150 and COMP 151 for the computer
science requirements
COMP 350   Software Engineering (3)
MATH 488   Scientific Computing (3, G.E.
B4,B3, Interdisciplinary))
MATH 454   Analysis of Algorithms (3)

Physics (6):
Students selecting this emphasis should take PHYS
200 and 201(8) as the science sequence.
MATH 350   Partial Differential Equations
and Mathematical Physics (3)
UPPER DIVISION PHYSICS COURSE   (3)

Applied Physics (6):
Students selecting this emphasis should take PHYS
200 and 201(8) as the science sequence.
COMP/PHYS 345   Digital Image Processing (3)
COMP/PHYS 445   Image Analysis and Pattern
Recognition (3)

Actuarial Sciences/Economics (9):
ECON 300   Fundamentals of Economics
(3, G.E. D)
ECON 486   Introduction to
Econometrics (3)
MATH 429   Operations Research (3)

Business Management (9):
ECON 300   Fundamentals of Economics
(3, G.E.D)
MATH 429   Operations Research (3)
Upper Division Management Course (3)

Cognitive Science (9):
MATH 430   Research Design and Data
Analysis (3)
PSY 210   Learning, Cognition and
Development
Upper Division Cognitive Psychology Course (3)

Education (9):
EDUC 512   EQUITY, DIVERSITY
AND FOUNDATION OF SCHOOLING

MATH 318   Mathematics for Secondary School Teachers (3)
MATH 393   Abstract Algebra (3)

Applied Mathematics:
MATH 450   Partial Differential Equations and Mathematical Physics (3)
MATH 448   Scientific Computing (3, G.E. B3, B4, Interdisciplinary)
MATH 429   Operations Research (3)

Digital Design:
MATH 393   Abstract Algebra (3)
ART 108   Visual Technologies (3)
ART 312 or 314   Digital Media Art

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

Junior Year (15-18 Units + G.E):
MATH 331   History of Mathematics (3, G.E. B3, D,   Interdisciplinary)
MATH 352   Probability and Statistics (3)
MATH 351   Real Analysis (3)
Choose one of the groups from the Emphasis Courses listed above.

Senior Year (14-15 Units+ G.E.):
MATH 452   Complex Analysis (3)
MATH 499   Senior Colloquium (1) Fall
MATH 499   Senior Colloquium (1) Spring
Choose 3 or more Math Electives (9-12)

TOTAL REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN MATHEMATICS DEGREE
(120 units)

Lower Division Required Major Courses (34-35)
Upper Division Required Major Courses (20)
Upper Division Elective and Emphasis Major Courses (15-19)
Electives (16)
General Education Included in Major Requirements (18)
General Education and Title V Requirements (34)

REQUIREMENTS FOR THE MINOR IN

MATH 318   Mathematics for Secondary School Teachers (3)
MATH 393   Abstract Algebra (3)

Applied Mathematics:
MATH 450   Partial Differential Equations and Mathematical Physics (3)
MATH 448   Scientific Computing (3, G.E. B3, B4, Interdisciplinary)
MATH 429   Operations Research (3)

Digital Design:
MATH 393   Abstract Algebra (3)
ART 108   Visual Technologies (3)
ART 312 or 314   Digital Media Art

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

Junior Year (15-18 Units + G.E):
MATH 331   History of Mathematics (3, G.E. B3, D,   Interdisciplinary)
MATH 352   Probability and Statistics (3)
MATH 351   Real Analysis (3)
Choose one of the groups from the Emphasis Courses listed above.

Senior Year (14-15 Units+ G.E.):
MATH 451   Complex Analysis (3)
MATH 499   Senior Colloquium (1) Fall
MATH 499   Senior Colloquium (1) Spring
Choose 3 or more Math Electives (9-12)

TOTAL REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN MATHEMATICS DEGREE
(120 units)

Lower Division Required Major Courses (34-35)
Upper Division Required Major Courses (20)
Upper Division Elective and Emphasis Major Courses (15-19)
Electives (16)
General Education Included in Major Requirements (18)
General Education and Title V Requirements (34)

REQUIREMENTS FOR THE MINOR IN

MATHEMATICS (20 units)	**MATHEMATICS (20 units)**
MATH 150 Calculus I (4) MATH 151 Calculus II (4) MATH 300 Discrete Math (3) In addition, students should select three upper division courses (9 units) from the Mathematics program approved by the advisor	MATH 150 Calculus I (4) MATH 151 Calculus II (4) MATH 300 Discrete Math (3) In addition, students should select three upper division courses (9 units) from the Mathematics program approved by the advisor

SUMMARY OF CHANGES: The courses chosen for emphasis of study may not be counted as an elective course. MATH 320 Mathematics and Fine Arts and MATH/COMP 452 Computational Bioinformatics were added as elective courses. All classes recommend for students who plan on teaching mathematics are designated with a T.

JUSTIFICATION: Changes made to meet CCTC Single Subject Matter in Mathematics requirements.

____Ivona Grzegorczyk_____2/15/04_____
Proposer of Program Modification   Date

Approvals

_____
Program Chair   Date

_____
Curriculum Committee Chair   Date

_____
Dean   Date

California State University Channel Islands
Program Modification Consultation Sheet

1. Course Title: _____

_____

2. Program Area: _____

Recommend Approval

Program Area/Unit	Program/Unit Chair	YES	NO (attach objections)	Date
Art				
Biology				
Business & Economics				
Education				
English				
History				
Liberal Studies				
Mathematics & CS				
Multiple Programs				
Psychology				
Library				
Information Technology				