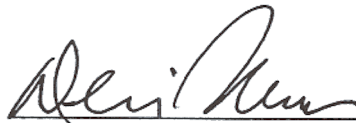


**SENATE RESOLUTION 26-01**

**Motion: to approve the Bachelor of Science in Mathematics**

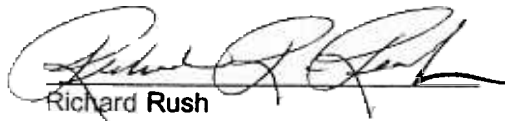
**Passed at the November 27, 2001 meeting of the Academic Senate**

**APPROVALS:**



Dennis Muraoka  
Chair, Academic Senate

Date: 12/10/01



Richard Rush  
President, CSU Channel Islands

Date: 12/17/01

PROPOSAL TO OFFER A NEW ACADEMIC PROGRAM/ MAJOR IN FALL 2002  
(LONG FORM)

Proposed Name of Degree: Bachelor of Science in Mathematics  
Options/ Emphases in the Degree:  
Faculty Proposing New Program: Ivona Grzegorzcyk, PhD

**Review and Approval:**

1. Curriculum Committee Approval:

Curriculum Chair: [Signature] Date: 12/10/01

2. Academic Senate Approval:

Chair, Academic Senate: [Signature] Date: 12/11/01

3. Administration Approval:

President (or designee): [Signature] Date: 12/17/01

## PROCEDURE FOR SUBMITTING PROPOSALS FOR NEW PROGRAMS

A campus, in accordance with its approved academic master plan, submits detailed proposals for new degree major programs to the Office of Academic Program Planning for review and approval in the academic year preceding projected implementation. Approval of any degree major program is subject to campus assurances that financial support, qualified faculty, physical facilities and library holdings sufficient to establish and maintain the program will be available within current budgetary support levels. The proposal must follow the format below, and four copies should be sent to Academic Program Planning, Office of the Chancellor.

### Definition of the Proposed Degree Major Program

Name of the campus submitting the request, the full and exact designation (degree terminology) for the proposed degree major program, and academic year of intended implementation.

California State University Channel Islands  
Bachelor of Science in Computer Science  
Fall 2002

- b. Name of the department, departments, division or other unit of the campus that would offer the proposed degree major program. Identify the unit that will have primary responsibility.

Academic Affairs

- c. Name, title, and rank of the individual(s) primarily responsible for drafting the proposed degree major program.

Ivona Grzegorzcyk, PhD  
Associate Professor of Mathematics

- d. Objectives of the proposed degree major program.

- 1 Provide students with the opportunity to earn a state-supported Bachelor degree in Mathematics from the California State University.  
Prepare students for employment in a variety of highly sophisticated and complex high-tech and bio-tech industries, as well as in mathematics education.  
Prepare students for further study in graduate or professional schools.  
Offer all CSUCI students the opportunity to broaden their knowledge and learn in this subject area.

Total number of units required for the major. List of all courses, by catalog number, title, and units of credit, to be specifically required for a major under the proposed degree program. Identify those new courses that are (1) needed to initiate the program and (2) needed during the first two years after implementation. Include proposed catalog descriptions of all new courses.

120 semester units required for the major.

Since CSUCI will only begin admitting students in Fall 2002, all courses are new and will be needed to initiate the program. These courses will be offered during the first two years (and subsequent years) after program implementation. See the following pages for Courses and Catalog Descriptions.

## **LOWER LEVEL REQUIREMENTS (37 Units)**

MATH 150 Calculus I (4, G.E B3)  
MATH 151 Calculus II (4)  
MATH 250 Calculus III (3)  
COMP 150 Object Oriented Programming (4)  
COMP 151 Data Structures and Program Design (4)  
MATH/PHIL 230 Logic (3) (G.E. A3)  
MATH 240 Linear Algebra (3)  
PHYS 200 General Physics I (4, G.E. B2)  
Two Additional Sciences courses 8 units (G.E. B2)

## **UPPER LEVEL REQUIREMENTS (46 Units)**

### **Math core (19 units):**

MATH 300 Discrete Mathematics (3)  
MGT 346 Scientific and Professional Ethics (3, G.E. D)  
MATH 342 Probability and Statistics (3, G.E. A3)  
MATH 350 Differential Equations and Dynamical Systems (3)  
MATH 351 Real Analysis (3)  
MATH 452 Complex Analysis (3)  
COMP 499 Senior Colloquium (1)

**Emphasis- choose one of the following interdisciplinary sequences for your mathematics application emphasis (6-10 units).** The choice of emphasis should reflect student specialization and require approval by the student's advisor.

### **Biomathematics (6):**

Student selecting this emphasis should take BIOL 200 and 201 (8) as the science sequence.

MATH 430 Research design and Data Analysis (3)  
COMP 431 Bioinformatics (3)

### **Computational Chemistry (6):**

Student selecting this emphasis should take CHEM 121 and 122 General Chemistry I and II (8) as the science sequence.

MATH 349 Symmetry Groups and Science (3)  
MATH 430 Research design and Data Analysis (3)

### **Computer Science (9):**

COMP 350 Software Engineering (3)  
MATH 451 Numerical Analysis (3)  
MATH 344 Analysis of Algorithms (3)

### **Physics:**

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

MATH 350 Partial Differential Equations and Mathematical Physics (3)  
MATH 352 Complex Analysis

### **Actuarial Sciences/Economics (9):**

ECON 300 Fundamentals of Economics (3, G.E. D)  
ECON 486 Econometrics (3)  
MATH 440 Operations Research (3)

### **Business Management (9):**

ECON 300 Fundamentals of Economics (3, G.E.D))

MATH 440 Operations Research (3)  
MGT – upper division management course (3)  
**Cognitive Science (9):**  
MATH 343 Research design and Data Analysis (3)  
PSY 320 Cognitive Psychology (3)  
PSY 450 Neuroscience or other upper division cognitive psychology course (3)  
**Education:**  
EDUC 320 Education in Modern Society (3) or PSY 200 Introduction to Psychology (3)  
MATH 318 Mathematics for Secondary School Teachers (3)  
MATH 331 History of Mathematics(3)  
**Applied Mathematics:**  
MATH 450 Partial Differential Equations and Mathematical Physics (3)  
MATH 451 Numerical Analysis (3)  
MATH 440 Operations Research (3)  
**Digital Design:**  
MATH 393 Abstract Algebra (3)  
ART 108 Visual Technologies (3)  
ART 300 Digital Art technologies or ART 312, ART 322 (3)

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

**Choose 3 or more Mathematics Electives (9 or more) from the following list:**

MATH 318 Mathematics for Secondary School Teachers (3)  
MATH 331 History of Mathematics (3)  
MATH 349 Symmetry Groups and Science (3)  
MATH 344 Analysis of Algorithms (3)  
MATH 393 Abstract Algebra (3)  
MATH 430 Research design and Data Analysis (3)  
MATH 440 Operations Research (3)  
MATH 450 Partial Differential Equations and Mathematical Physics (3)  
MATH 451 Numerical Analysis (3)  
MATH 480 Differential and Riemannian geometry (3)  
MATH 482 Number Theory and Cryptography (3)  
MATH 484 Algebraic Geometry and Coding Theory (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)

**TOTAL MATHEMATICS CREDITS: 71-75 units (including 18G.E. credits)**

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**REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN MATHEMATICS  
DEGREE:**

Lower Division Required Major Courses .....	37
Upper Division Required Major Courses.....	34-38
Elective Courses .....	13
General Education Included in Major Requirements	(18)
General Education & Title V.....	36
Total	120

**COURSE DESCRIPTIONS FOR CATALOG**

**MATH 100. Review of Pre-college Mathematics.**

A review of the fundamental concepts of arithmetic, measurement geometry, and elementary and intermediate algebra. This course is offered Credit/No Credit only. No credit given towards the baccalaureate degree.

**MATH 101. College Algebra (3)**

Prerequisite: A passing score on the Entry Level Mathematics Examination. Basic set theory, number systems and their algebraic properties; systems of equations and inequalities; basic analytic geometry, matrix algebra and elementary functions. Problem solving.

**MATH 105. Pre-calculus (4)**

Prerequisite: A passing score on the Entry Level Mathematics Examination. Number systems and their algebraic properties; systems of equations and inequalities; basic analytic geometry of lines and conic sections; elementary functions including polynomial, rational, exponential, and logarithmic, with emphasis on trigonometric functions, fundamental theorem of algebra and theory of equations; polar equations and curves.

**MATH 108 Mathematical Thinking (3)**

GE- A3 or B3

A course presents the diversity of mathematics and the spirit, in which it is employed in various situations, including different problem solving strategies, inductive- deductive reasoning, paradoxes, puzzles and mathematical modeling. The contributions of various cultures and influences of other disciplines are studied. At least one significant writing assignment is required.

**MATH 140 . Calculus for Business Applications I (3)**

Prerequisites: A passing score on the Entry Level Mathematics Examination, or credit in Math 105. An integrated course in analytic geometry and calculus in the context of business and economics applications. Functions, limits, derivatives, integrals and mathematical modeling are used in problem solving in decision making context.

**MATH 150. Calculus I (4)**

GE-A3 or B3

Prerequisite: Passing scores on the Entry Level Mathematics Examination and on the Mathematics Placement Test. A course in analytic geometry and calculus. Elementary and transcendental functions are introduced and their properties are studied, limits, derivatives, integrals and mathematical modeling are used in problem solving in sciences.

**MATH 151. Calculus II (4)**

Prerequisite: MATH 150 with a Grade of C or better. Includes the study of integration, sequences, infinite series, and power series.

**MATH 202 Biostatistics (4)**

GE-A3 or B1

Prerequisite: A passing score on the Entry Level Mathematics Exam or credit in MATH 105. Introduction to modern statistical methods in biosciences, especially in studies of population and experimental data analysis. Descriptions of sample data, probability, theoretical frequency distributions, sampling, estimation, testing hypotheses. Course will include treatment of quantitative data, problems and problem-solving techniques, and use of technology in statistics.

**MATH 208. Modern Math for Elementary Teachers I– Numbers and Problem Solving (3)**

Current issues of modern math curriculum including abstract thinking and problem solving approaches to teaching. Content covers systems of numeration, nature of numbers and fundamental operations, relations and functions, properties of integers, rational and real numbers, and mathematical modeling. Problem solving strategies and geometric interpretations are stressed. Designed for students intending to teach in K-8. This course is not open to students who have credit for Calculus.

**MATH/PHIL 230 Logic**

GE- A3

Introduction to modern deductive logic. Critical thinking and abstract approach to common language. Includes abstract sets and number sets, relations, propositional logic- including common language cases, and theory of quantification.

**MATH 240. Introduction to Linear Algebra (3)**

Prerequisite: Completion of MATH 151.

Vector spaces, linear transformations, orthonormality, characteristic polynomial, quadratic forms, spectral decomposition.

**MATH 250. Calculus III (3)**

Prerequisite: Completion of MATH 151 with a grade of C or better. Functions of several variables, solid analytic geometry, partial differentiation, multiple integrals with applications. Vector analysis, line and surface integrals.

**MATH 300. Discrete Mathematics (3)**

Prerequisites: MATH 151 and MATH 230.

Sets, algebraic systems, axioms, definitions, propositions and proofs. Combinatorics, graph theory, moduli calculus. Coding, coding errors and Hamming codes. Students are expected to write mathematical proofs, and communicate mathematical ideas clearly in written and oral form.

**MATH 308 Modern Mathematics for Elementary School Teachers II– Geometry, Probability and Statistics (3)**

Current issues of modern math curriculum including abstract thinking and problem solving approaches to teaching. Content covers systems of geometry and geometric interpretation of real numbers, geometric constructions, mathematical modeling, basic probability and statistics. Problem solving strategies are stressed. Designed for students intending to teach.

**MATH 318 Mathematics for Secondary School Teachers II– Geometry, Probability and Statistics (3)**

Current issues of modern secondary school math curriculum including abstract thinking and problem solving approaches to teaching. Content covers systems of geometry, algebra, precalculus, calculus, probability and statistics. Designed for students intending to teach.

**MATH 330 Mathematics for Artists (3)**

**GE- B3 or C1**

The course is specially designed for students interested in fine arts, with the emphasis on understanding geometric patterns and concepts by self-explorations. Instead of concentrating on abstraction, the course creates a vast reservoir of art-related examples and hands-on experiences, and will give an innovative mathematical background for future artistic endeavors of students.

**MATH 331 History of Mathematics (3)**

**GE- B or D**

Study of breakthrough mathematical ideas and their creators, including historical and scientific context. Important concepts of current mathematics are studied: inception, development, difficulties, significance and various viewpoints will be presented. Lecture-discussion. At least one significant writing assignment is required.

**MATH 340. Statistics for Business and Economics (3)**

Introduction to modern statistical methods used in business analysis and economics, especially in experimental data evaluation and decision making contexts. Topics include: sampling, probability, various distributions, correlation and regression, statistical inferences, hypothesis testing, problem solving and the consequences to underlying economical systems. Includes a project in the community.

**MATH 342 Probability and Statistics (3) (Math – Computer Sciences) A3 or B3**

Prerequisite: MATH 151. Data gathering, analysis and display. Validity of sampling methods and statistical conclusions. Probability, conditional probability, Bayes' Theorem, discrete and continuous random variables and their distribution (e.g., binomial, Poisson, hypergeometric, negative binomial, normal, exponential, gamma), moments, bivariate distributions,



transformations of random variables, central and other limit theorems. Bayesian estimates, tests of hypotheses, nonparametric tests, decision theory. Modern computer software applications in statistics.

**MATH 344. Analysis of Algorithms (3) (Math – Computer Sciences) B3**

Prerequisites: MATH 300 and some computer programming experience. Computer oriented study of seminumerical and non-numerical algorithms. Sorting, tree searching, generation of combinatorial structures, algorithm proof techniques, best algorithms, programming complexity, string matching.

**MATH 349. Symmetry Groups and Science (3)**

An examination of the symmetry of biological, chemical and geometric structures and objects, including the theory of point and space groups. Study of crystallographic groups and their representations.

**MATH 350. Differential Equations and Dynamical Systems (3)**

Prerequisite or Corequisite: Mathematics 250. Ordinary differential equations, existence and uniqueness of solutions. Linear equations. Laplace methods. Flows and diffeomorphisms, limit sets, iterations of maps. Positive entropy systems, chaotic behavior of trajectories.

**MATH 351. Real Analysis (3)**

Real number system, metric spaces, norms, function spaces. Continuity, differentiability, integrability of functions. Sequences and series.

**MATH 393. Abstract Algebra (3)**

Prerequisite: Mathematics 300. Rings, modules, fields and their extensions. Groups and group actions, crystallographic groups.

**MATH 430 Research Design and Data analysis (3) (Math – Natural Sciences) A3 or B3**

Prerequisite: MATH 324 or MATH 202

Experimental design, sampling methods, sampling distributions and statistical conclusions in biomedical fields. Bayesian estimates, tests of hypotheses, nonparametric tests. Regression and correlation. Replication, experimental errors, randomization. Modern computer software applications in statistics.

**MATH 440 Operations Research interdisciplinary GE- A3 or D**

Prerequisite: Course in statistics. Introduction to applied mathematical methods in management sciences. Topic include linear programming, managerial optimization methods, duality and equilibrium theorems, the simplex method, development of tools and methods required to make decisions and to solve operational problems in economy, decision and risk analysis, modeling and

game theory. Other topics selected from parametric programming, large scale methods, generalized programming.

**MATH 450. Partial Differential Equations and Mathematical Physics (3)**

Prerequisite: MATH 350 or consent of the instructor. Vector field theory, Fourier series.

**MATH 451. Numerical Analysis (3)**

Prerequisites: MATH 350 and COMP 151. Techniques of applied mathematics, solution of equations, finite differences, wavelets.

**MATH 452. Complex Analysis (3)**

Prerequisite: MATH 250. Complex variable, analytic functions, complex integration, power series and conformal mappings.

**MATH 480. Differential and Riemannian Geometry (3)**

Prerequisite: MATH 351. Implicit Function theorem. Riemannian manifolds, curvature, local isometries. Gauss- Bonnet Theorem.

**MATH 482. Number Theory and Cryptography (3)**

Prerequisite: MATH 300. Unique factorization theorem, congruencies, primitive roots and indices, quadratic residues and the law of quadratic reciprocity, distribution of primes. Cryptography.

**MATH 484. Algebraic Geometry and Coding Theory (3)**

Prerequisite: Mathematics 333. Study of algebraic varieties over algebraically closed fields. Modern application to coding theory.

**MATH 490. Topics in Modern Mathematics (3)**

Prerequisites: Junior standing. New developments in mathematics.

**MATH 492. Internship (3)**

Prerequisites: Junior standing and Program approval of written proposal of internship studies. Supervised work and study in industrial or scientific setting involving development of degree related skills. All students are required to present their projects at the Senior colloquium. Graded credit/no credit.

### **MATH 494. Independent Research (3)**

Prerequisites: Senior standing and Program approval of written proposal of independent research studies.

Supervised project involving theoretical research in the field of mathematics or its applications. All students are required to present their projects at the Senior Seminar.

### **MATH 497. Directed Study (3)**

Prerequisites: Senior standing and Program approval of written proposal of directed studies.

Supervised project involving library research. All students are required to present their projects at the Senior Seminar.

### **MATH 499. Senior Colloquium (1)**

Prerequisites: Senior standing.

Oral presentation of current advancements in the field, reports on students' projects, and invited lectures. Repeatable.

- f. List of elective courses, by catalog number, title, and units of credit that can be used to satisfy requirements for the major. Identify those new courses that are (1) needed to initiate the program and (2) needed during the first two years after implementation. Include proposed catalog descriptions of all new courses.

Since CSUCI will only begin admitting students in Fall 2002, all courses are new and will be needed to initiate the program.

Mathematics majors are required to choose interdisciplinary emphasis (additional 6-10 units) and complete 9 additional units of electives from the following list.

**Choose 3 or more Mathematics Electives (9 or more) from the following list:**

MATH 318 Mathematics for Secondary School Teachers (3)

MATH 331 History of Mathematics (3)

MATH 349 Symmetry Groups and Science (3)

MATH 451 Numerical Analysis (3)

MATH 344 Analysis of Algorithms (3)

MATH 393 Abstract Algebra (3)

MATH 430 Research design and Data Analysis (3)

MATH 440 Operations Research (3)

MATH 450 Partial Differential Equations and Mathematical Physics (3)

MATH 451 Numerical Analysis (3)

MATH 480 Differential and Riemannian geometry (3)

MATH 482 Number Theory and Cryptography (3)

MATH 484 Algebraic Geometry and Coding Theory (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)

## COURSE DESCRIPTIONS FOR CATALOG

See above descriptions

- g. **If any formal options, concentrations, or special emphases are planned under the proposed major, explain fully.**

Mathematics majors are required to plan their programs carefully and to choose an interdisciplinary emphasis from the following list (6-10 units) early in their studies.

### EMPHASIS IN MATHEMATICS MAJOR

**Emphasis- choose one of the following interdisciplinary sequences for your mathematics application emphasis (6-9).** The choice of emphasis should reflect student specialization and require approval by the student's advisor.

#### **Biomathematics (6):**

Student selecting this emphasis should take BIOL 200 and 201 (8) as the science sequence.

MATH 430 Research design and Data Analysis (3)

COMP 431 Bioinformatics (3)

#### **Computational Chemistry (6):**

Student selecting this emphasis should take CHEM 121 and 122 General Chemistry I and II (8) as the science sequence.

MATH 349 Symmetry Groups and Science (3)

MATH 430 Research design and Data Analysis (3)

#### **Computer Science (9):**

COMP 350 Software Engineering (3)

MATH 451 Numerical Analysis (3)

MATH 344 Analysis of Algorithms (3)

#### **Physics:**

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

MATH 350 Partial Differential Equations and Mathematical Physics (3)

MATH 352 Complex Analysis

#### **Actuarial Sciences/Economics (9):**

ECON 300 Fundamentals of Economics (3, G.E. D)

ECON 486 Econometrics (3)

MATH 440 Operations Research (3)

#### **Business Management (9):**

ECON 300 Fundamentals of Economics (3, G.E.D))

MATH 440 Operations Research (3)

MGT – upper division management course (3)

#### **Cognitive Science (9):**

MATH 343 Research design and Data Analysis (3)

PSY 320 Cognitive Psychology (3)

PSY 450 Neuroscience or other upper division cognitive psychology course (3)

#### **Education (9):**

EDUC 320 Education in Modern Society or PSYCH 200 Introduction to Psychology (3)

MATH 318 Mathematics for Secondary School Teachers (3)

MATH 331 History of Mathematics(3)

**Applied Mathematics (9):**

MATH 450 Partial Differential Equations and Mathematical Physics (3)

MATH 451 Numerical Analysis (3)

MATH 440 Operations Research (3)

**Digital Design (9):**

MATH 393 Abstract Algebra (3)

ART 108 Visual Technologies (3)

ART 300 Digital Art technologies or 312, 322 (3)

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

**h. Course prerequisites and other criteria for admission of students to the proposed degree major program, and for their continuation in it.**

Except as noted below, all courses are open to matriculated students of the University. Also, students must have declared themselves as Mathematics Majors and remain in good academic standing throughout their enrollment at CSUCI.

-Students seeking admission to the Mathematics Program must be officially accepted into CSUCI and declare themselves Mathematics Majors majors.

- Students must remain good academic standing.

- See catalog description of courses for prerequisites.

**i. Explanation of special characteristics of the proposed degree major program, e.g., in terminology, units of credit required, types of course work, etc.**

-The program contains the most up-to-date technical, theoretical and intellectual achievements in the field of Mathematics.

-It stresses modern applications in rapidly developing fields such as computer science, bioinformatics, computational chemistry and computer graphics.

-It implements the distinguishing characteristics of all CSUCI programs: an interdisciplinary and service learning approach to higher education.

**j. For undergraduate programs, provisions for articulation of the proposed major with community college programs.**

See the attached description of proposed articulation with local community colleges. The articulation agreements will be addressed during 2002.

- k. Provision for meeting accreditation requirements, where applicable, and anticipated date of accreditation request.

The program is designed in accordance the standards of American Mathematical Society

**2. Need for the Proposed Degree Major Program**

- a. List of other California State University campuses currently offering or projecting the proposed degree major program; list of neighboring institutions, public and private, currently offering the proposed degree major program.

Most other CSU campuses offer a Bachelor of Mathematics. In addition, three nearby private institutions (California Lutheran, Pepperdine, Westmont) offer some variations of the degree.

- b. Differences between the proposed program and programs listed in Section 2a above.

-The CSUCI Program will provide an opportunity to earn a state-supported Mathematics degree to students in the local service area. It will offer to some students a Secondary teaching Credential in Mathematics and to others access to a highly desired high-tech positions in a unique program that stresses an interdisciplinary learning approach.

- The program is designed to reflect rapidly changing needs of the modern industries and the sophisticated mathematics applications (for example in bioinformatics, data mining, computer graphics, internet development, security issues).

- The program provides service and internship learning with the local bio-tech and high –tech companies.

- f. Professional uses of the proposed degree major program.

The Bachelor of Science in Mathematics will prepare students for a variety of high-tech and bio-tech industrial positions. The degree would also prepare students for graduate school in computer related fields.

- g. The expected number of majors in the year of initiation and three years and five years thereafter. The expected number of graduates in the year of initiation and three years and five years thereafter.

	<u>Number of Majors*</u>	<u>Number of Graduates*</u>
Initiation Year	20	0
Third year	40	25
Fifth year	80	50

\*from CSUCI projections.

**3. Existing Support Resources for the Proposed Degree Major Program**

- a. Faculty members, with rank, appointment status, highest degree earned, date and field of highest degree, and professional experience (including publications if the proposal is for a graduate degree), who would teach in the program.

Ivona Grzegorzcyk  
Associate Professor of Mathematics  
PhD in Mathematics, 1990  
Mathematics Professor since 1992

One (or more if interdisciplinary) additional full-time professors in the Mathematics area are planned for Fall 2002

Other CSCUI full-time computer science (3) and science (3) faculty will offer interdisciplinary and computation intensive application courses.

This program will require classroom space, computer laboratory space, library materials, library electronic databases and the use of Information Technology (IT) resources.

The program assumes the development of campus resources for students, faculty and staff: parking, offices, food service, health services and key academic support resources (admission, advising, records, etc.).

#### **4. Additional Support Resources Required**

- b. Any special characteristics of the additional faculty or staff support positions needed to implement the proposed program.

During 2002, CSUCI anticipates hiring two tenure track faculty members to assist in offering Mathematics program.

- c. The amount of additional lecture and/or laboratory space required to initiate and sustain the program over the next five years. Indicate any additional special facilities that will be required. If the space is under construction, what is the projected occupancy date? If the space is planned, indicate campus-wide priority of the facility, capital outlay program priority, and projected date of occupancy.

The program will use the existing classroom space and new computer labs that are being developed.

- d. Additional library resources needed. Indicate the commitment of the campus to purchase or borrow through interlibrary loan these additional resources.

No additional library resources needed above the existing CSUCI Library acquisition program. The faculty is working with the Library staff to assure an appropriate level and subject distribution of library resources.

- e. Additional equipment or specialized materials that will be (1) needed to implement the program and (2) needed during the first two years after initiation. Indicate the source of funds and priority to secure these resource needs.

No new needs beyond those planned during the development of the campus facilities.

#### **5. Abstract of the Proposal and Proposed Catalog Description**

# MATHEMATICS

Mathematics can be pursued as a scholarly discipline of an especially elegant kind—a creative art form—or it can be treated as a valuable tool in an applied discipline. Our program will address both needs: it 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. 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 Imaging or Artificial Intelligence

## DEGREES OFFERED:

Bachelor of Mathematics  
Minor in Mathematics

## CONTACT INFORMATION

Ivona Grzegorzczuk, Associate Professor of Mathematics  
Phone: (805) 437-8868 Fax: (805) 437-8864  
Web Page: <http://www.csuci.edu>  
Email: [ivona.grze@csuci.edu](mailto:ivona.grze@csuci.edu)

## PROPOSED COURSE OF STUDY:

### FRESHMAN YEAR (30 Units)

ENGL 100 Composition and Rhetoric (3, G.E. A1)  
MATH 150 Calculus 1 (4, G.E. B3)  
COMP 150 Object Oriented Programming (4)  
G.E. Section A, C, D, or E (3)

MATH 151 Calculus 2 (4)  
MATH/PHIL 230 Logic (3, G.E. A3 or C3)  
COMP 151 Data Structures and Program Design (3)  
Physics I  
G.E. Section A, C, D, or E (3)

### SOPHOMORE YEAR (28-31 Units)

MATH 250 Calculus III (3)  
MATH 240 Linear Algebra (3)  
MATH 300 Discrete Mathematics (3)  
MATH 350 Differential Equations and Dynamical Systems (3)  
MGT 346 Scientific and Professional Ethics (3, G.E. D)  
Select one 2 semester science sequence and an additional science course (one lab section required) in Physics, Biology, or Chemistry (13-16, G.E. B1 and B2)

NOTE: By the sophomore year student should decide on one of the following emphasis to plan their electives :

### Biomathematics (6):

Student selecting this emphasis should take BIOL 200 and 201 (8) as the science sequence.

MATH 430 Research design and Data Analysis (3)

COMP 431 Bioinformatics (3)

### Computational Chemistry (6):

Student selecting this emphasis should take CHEM 121 and 122 General Chemistry I and II (8) as the science sequence.

MATH 349 Symmetry Groups and Science (3)

MATH 430 Research design and Data Analysis (3)

### Computer Science (9):

COMP 350 Software Engineering (3)

MATH 451 Numerical Analysis (3)

MATH 344 Analysis of Algorithms (3)

### Physics:

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

MATH 350 Partial Differential Equations and Mathematical Physics (3)

MATH 352 Complex Analysis

### Actuarial Sciences/Economics (9):

ECON 300 Fundamentals of Economics (3, G.E. D)

ECON 486 Econometrics (3)

MATH 440 Operations Research (3)

### Business Management (9):

ECON 300 Fundamentals of Economics (3, G.E. D)

MATH 440 Operations Research (3)

MGT – upper division management course (3)

### Cognitive Science (9):

MATH 343 Research design and Data Analysis (3)

PSY 320 Cognitive Psychology (3)

PSY 450 Neuroscience or other upper division cognitive psychology course (3)

### Education:

EDUC 320 Education in Modern Society (3) or PSY 200

Introduction to Psychology (3)

MATH 318 Mathematics for Secondary School Teachers (3)

MATH 331 History of Mathematics (3)

### Applied Mathematics:

MATH 450 Partial Differential Equations and Mathematical Physics (3)

MATH 451 Numerical Analysis (3)

MATH 440 Operations Research (3)

### Digital Design:

MATH 393 Abstract Algebra (3)

ART 108 Visual Technologies (3)

ART 300 Digital Art technologies or ART 312, ART 322 (3)

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

### JUNIOR YEAR (18 Units + G.E.)

MATH 342 Probability and Statistics (3, G.E. A3)

MATH 351 Real Analysis (3)

MATH 452 Complex Analysis (3)

Choose one of the groups Emphasis Courses from the list above.

### SENIOR YEAR (20-21 Units+ G.E.)

Math 499 Senior Colloquium (1)

Choose 3 or more Math Electives (9) from the following list.



**ELECTIVES in MAJOR (9-10 units) from the following list:**

- MATH 318 Mathematics for Secondary School Teachers (3)
- MATH 331 History of Mathematics (3)
- MATH 349 Symmetry Groups and Science (3)
- MATH 344 Analysis of Algorithms (3)
- MATH 393 Abstract Algebra (3)
- MATH 430 Research design and Data Analysis (3)
- MATH 440 Operations Research (3)
- MATH 450 Partial Differential Equations and Mathematical Physics (3)
- MATH 451 Numerical Analysis (3)
- MATH 480 Differential and Riemannian geometry (3)
- MATH 482 Number Theory and Cryptography (3)
- MATH 484 Algebraic Geometry and Coding Theory (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)

**OTHER ELECTIVES (13 units)**

**TOTAL UNITS IN THE MAJOR: 71-75 units**

**REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN MATHEMATICS DEGREE:**

Lower Division Required Major Courses.....	37
Upper Division Required Major Courses.....	34-38
Elective Courses .....	13
General Education Included in Major Requirements.....	(18)
General Education & Title V .....	36

**Total .120**

**MINOR IN MATHEMATICS (20)**

- MATH 150 Calculus 1 (4)
- MATH 151 Calculus 2 (4)
- MATH 300 Discrete Math (3)

Select three upper upper-division courses from the Mathematics program approved by the advisor (9).

**TOTAL UNITS IN THE MINOR: 20 units**

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See

**COURSE DESCRIPTIONS FOR CATALOG**