CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

COURSE MODIFICATION PROPOSAL

Courses must be submitted by October 15, 2011, and finalized by the end of the fall semester to make the next catalog (2012-13) production

DATE (CHANGE DATE EACH TIME REVISED): 9/22/2011; REV 10.21.11; REV 11.4.11
PROGRAM AREA(S) : MATH

Directions: All of sections of this form must be completed for course modifications. Use YELLOWED areas to enter data. All documents are stand alone sources of course information.

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1. Indicate Changes and Justification for Each. *[Mark all change areas that apply and follow with justification. Be as brief as possible but, use as much space as necessary.]*

- Course title
- Prefix/suffix
- Course number
- Units
- Staffing formula and enrollment limits
- Prerequisites/Corequisites
- X Catalog description
- X Mode of Instruction
- Course Content
- X Course Learning Outcomes
- References
- GE
- Other
- Reactivate Course

Justification: More accurate and energetic catalog description. Student learning outcomes modified to reflect senate policy SP06-06 on GE outcomes.

2. Course Information.
[Follow accepted catalog format.] ***(Add additional prefixes i f cross-listed)***

OLD

Prefix MATH Course# 448
Title Scientific Computing Units (3)
3 hours lecture per week
hours blank per week

Prerequisites: Math 350 or Comp 151 and Math 151
Consent of Instructor Required for Enrollment
Corequisites:

Catalog Description (Do not use any symbols):
Topics include: techniques of applied mathematics, solution of equations, finite differences, and wavelets.

General Education Categories: B3, B4, UDIGE
Grading Scheme (Select one below):
X A – F
Credit/No Credit
Optional (Student's Choice)
Repeatable for up to units
Total Completions
Multiple Enrollment in Same Semester Y/N
Course Level:
X Undergraduate
Post-Baccalaureate
Graduate

NEW

Prefix MATH Course# 448
Title Scientific Computing Units (3)
3 hours lecture per week
hours blank per week

Prerequisites: Math 350 or Comp 151 and Math 151
Consent of Instructor Required for Enrollment
Corequisites:

Catalog Description (Do not use any symbols)**:**
Examines the challenges of programming computers to perform mathematical computations accurately and efficiently. Students learn how ideas from calculus are used to create algorithms to solve mathematical problems numerically.

General Education Categories: B3, B4, UDIGE
Grading Scheme (Select one below):
X A – F
Credit/No Credit
Optional (Student's Choice)
Repeatable for up to units
Total Completions
Multiple Enrollment in Same Semester Y/N
Course Level:
X Undergraduate
Post-Baccalaureate
Graduate

3. Mode of Instruction (Hours per Unit are defaulted) **Hegis Code(s)**_____
(Provided by the Dean)

	Existing					Proposed					
	Units	Hours Per Unit	Benchmark Enrollment	Graded		Units	Hours Per Unit	Benchmark Enrollment	Graded	CS No. (filled out by Dean)
Lecture	3	1	30	X	Lecture	3	24	20	X	
Seminar		1			Seminar		1			
Lab		3			Lab		3			
Activity		2			Activity		2			
Field Studies					Field Studies					
Indep Study					Indep Study					
Other blank					Other blank					
Online					Online					

4. Course Attributes:

B3, B4, UDIGE **General Education Categories**: All courses with GE category notations (including deletions) must be submitted to the GE website: http://summit.csuci.edu/geapproval. Upon completion, the GE Committee will forward your documents to the Curriculum Committee for further processing.

A (English Language, Communication, Critical Thinking)
- A-1 Oral Communication
- A-2 English Writing
- A-3 Critical Thinking

B (Mathematics, Sciences & Technology)
- B-1 Physical Sciences
- B-2 Life Sciences – Biology
- X B-3 Mathematics – Mathematics and Applications
- X B-4 Computers and Information Technology

C (Fine Arts, Literature, Languages & Cultures)
- C-1 Art
- C-2 Literature Courses
- C-3a Language
- C-3b Multicultural

D (Social Perspectives)

E (Human Psychological and Physiological Perspectives)

X **UDIGE/INTD Interdisciplinary**

Meets University Writing Requirement

Meets University Language Requirement

American Institutions, Title V Section 40404: Government US Constitution US History
Refer to website, Exec Order 405, for more information: http://senate.csuci.edu/comm/curriculum/resources.htm

Service Learning Course (Approval from the Center for Community Engagement must be received before you can request this course attribute).

5. Justification and Requirements for the Course. *[Make a brief statement to justify the need for the course]*

OLD
This course is required for Computer Science students according to accreditation guidelines and is an elective for

NEW
This course is required for Computer Science students according to accreditation guidelines and is an elective for

Mathematics majors who are specializing in Computer Science. Can be used as a general education course.	Mathematics majors who are specializing in Computer Science. Can be used as a general education course.
X Requirement for the Major/Minor	X Requirement for the Major/Minor
X Elective for the Major/Minor	X Elective for the Major/Minor
Free Elective	Free Elective

Submit Program Modification if this course changes your program.

6. Student Learning Outcomes. (List in numerical order. You may wish to visit resource information at the following website: http://senate.csuci.edu/comm/curriculum/resources.htm)

Upon completion of the course, the student will be able to:	Upon completion of the course, the student will be able to:
OLD	**NEW**
1. Discuss analysis and development of numerical algorithms	1. Solve problems using mathematical methods and relevant technology.
2. Apply scientific computing methods to the solution of differential equations, nonlinear equations, as well as interpolation,	2. Write effectively in various forms.
3. Apply numerical differentiation and methods for evaluating definite integrals	3. Integrate content, ideas, and approaches from integrative perspectives across disciplines.
4. Discuss the errors involving numerical methods	4. Apply scientific computing methods to the solution of mathematical problems using computers.
5. Implement numerical methods on computers.	5. Discuss the errors involving numerical methods.

7. Course Content in Outline Form. (Be as brief as possible, but use as much space as necessary)

OLD	**NEW**
Finite Difference Methods and Algorithms	Finite Difference Methods and Algorithms
Finite Element Methods and Algorithms	Finite Element Methods and Algorithms
Large Systems of Linear Equations and Algorithms	Large Systems of Linear Equations and Algorithms
Non-linear equations and Algorithms	Non-linear equations and Algorithms
Ordinary Differential Equations and Algorithms	Ordinary Differential Equations and Algorithms
Trigonometric and Fourier transforms	Trigonometric and Fourier transforms
Monte Carlo methods	Monte Carlo methods

Does this course content overlap with a course offered in your academic program? Yes No **No** X
If YES, what course(s) and provide a justification of the overlap.

Does this course content overlap a course offered in another academic area? Yes No **No** X
If YES, what course(s) and provide a justification of the overlap.

Overlapping courses require Chairs' signatures.

8. Cross-listed Courses (Please note each prefix in item No. 1)

- **A. List cross-listed courses (Signature of Academic Chair(s) of the other academic area(s) is required).**
- **B. List each cross-listed prefix for the course:**
- **C. Program responsible for staffing:**

9. References. *[Provide 3-5 references]*

OLD Gerald / Wheatley, Applied Numerical Analysis, sixth edition, Addison Wesley 1998

NEW
Gerald and Wheatley, Applied Numerical Analysis, seventh edition, Addison Wesley 2003
Heath, Scientific Computing, second edition, McGraw-Hill, 2002
Leader, Numerical Analysis and Scientific Computing, first edition, Addison-Wesley, 2004

10. Tenure Track Faculty qualified to teach this course.
All Mathematics Faculty

11. Requested Effective Date or First Semester offered: 1/1/12

12. New Resource Requested: Yes **No** X
If YES, list the resources needed.

A. Computer Needs (data processing, audio visual, broadcasting, other equipment, etc.)
Access to computer labs required
B. Library Needs (streaming media, video hosting, databases, exhibit space, etc.)
C. Facility/Space/Transportation Needs:
D. Lab Fee Requested: Yes **No** **(Refer to the Dean's Office for additional processing)**
E. Other.

13. Will this course modification alter any degree, credential, certificate, or minor in your program? Yes **No** X
If, YES attach a program update or program modification form for all programs affected.
Priority deadline for New Minors and Programs: October 1, 2011 of preceding year.
Priority deadline for Course Proposals and Modifications: October 15, 2011.
Last day to submit forms to be considered during the current academic year: April 15th.

Geoffrey Buhl — 9/22/11

Proposer(s) of Course Modification — Date
Type in name. Signatures will be collected after Curriculum approval.

Course: MATH448 Scientific Computing
Area: B3 Mathematics -- Mathematics and Applications
Date Submitted: 10/5/2011 2:51:21 PM

1. Promote the understanding and appreciation of the methodologies of math or science as investigative tools and the limitations of mathematical or scientific endeavors

Students will learn how ideas from calculus are used to create algorithms used by computers to solve mathematical problems.

2. Present mathematical or scientific knowledge in a historical prespective and the influences of math and science on the development of world civilizations, both past and present

Historical ideas in calculus are presented and the history of the development of computer algorithms is covered.

3. Apply inductive and deductive reasoning processes and explore fallacies and misconceptions in the mathematical or scientific areas

Students will use reasoning to explore error and efficiency of mathematical algorithms. They will examine mathematical proofs in the area of numerical analysis. They will implement ideas from calculus on computers.

4. Promote an understanding of mathematical ideas and problem solving skills

Students will learn to implement numerical methods inspired by calculus on computers. Students will work on four open ended problems in the areas of root finding, matrix decomposition, integration, and derivation. These problem with require students to choose appropriate numerical techniques for their problem and implement the numerical technique efficiently on computers.

Course: MATH448 Scientific Computing
Area: B4 Computers and Information Technology
Date Submitted: 10/5/2011 2:55:24 PM

1. Promote the understanding and appreciation of the methodologies of math or science as investigative tools and the limitations of mathematical or scientific endeavors

Students will learn how ideas from calculus are used to create algorithms used by computers to solve mathematical problems.

2. Present mathematical or scientific knowledge in a historical prespective and the influences of math and science on the development of world civilizations, both past and present

Historical ideas in calculus are presented and the history of the development of computer algorithms is covered.

3. Apply inductive and deductive reasoning processes and explore fallacies and misconceptions in the mathematical or scientific areas

Students will use reasoning to explore error and efficiency of mathematical algorithms. They will examine mathematical proofs in the area of numerical analysis. They will implement ideas from calculus on computers.

4. Include use of computers or information technology to solve problems as appropriate

Student will implement mathematical algorithms on computers.

Course: MATH448 Scientific Computing
Area: UDIGE Upper Division Interdisciplinary GE
Date Submitted: 9/22/2011 3:14:14 PM

1. Emphasize interdisciplinarity by integrating content, ideas, and approaches from two or more disciplines

Students will explore the intersection of computer science and mathematics and the synergy that both approaches share in approaches to computational problems.

2. Include substantive written work consisting of in-class writing as well as outside class writing of revised prose. Examples of appropriate written work include: short papers, long papers, term papers, lab reports, documentation, disciplinary-based letters and memos, and essays.

Students are required to write up and revise project reports based on instructor and peer feedback.

Approval Sheet

Course: MATH 448

If your course has a General Education Component or involves Center affiliation, the Center will also sign off during the approval process.

Multiple Chair fields are available for cross-listed courses.

The CI program review process includes a report from the respective department/program on its progress toward accessibility requirement compliance. By signing below, I acknowledge the importance of incorporating accessibility in course design.

Program Chair		
	Signature	Date
Program Chair		
	Signature	Date
Program Chair		
	Signature	Date
General Education Chair		
	Signature	Date
Center for Multicultural Engagement Director		
	Signature	Date
Center for Civic Engagement and Service Learning Director		
	Signature	Date
Curriculum Chair		
	Signature	Date
AVP		
	Signature	Date