CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

COURSE MODIFICATION PROPOSAL

Courses must be submitted by November 2, 2009, to make the next catalog (2010--2011) production

DATE (CHANGE DATE EACH TIME REVISED): 11/2/2009; REV 12.14.09

PROGRAM AREA(S) : PHYSICS

Directions: All of sections of this form must be completed for course modifications. All documents are stand alone sources of course information.

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1. Course Information.

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

OLD

Prefix PHYS Course# 304 Title ELECTROMAGNETISM
Units (4)
4 hours lecture per week
hours blank per week

x Prerequisites: PHYS 101 OR 201 AND MATH 151
Consent of Instructor Required for Enrollment
Corequisites:

Catalog Description (Do not use any symbols): A calculus-based introduction to the concepts and principles of electricity and magnetism. Topics include: electrostatics, magnetism, electromagnetic theory, fields, electromagnetic waves, Maxwell's equations, and the Special Theory of Relativity. A strong emphasis will be on analytical problem-solving skills and applications.

General Education Categories
Lab Fee Requested

Graded
CR/NC
X A - F

Repeatable for up to units
Total Completions

Course Level:
X Undergraduate
Post-bac/Credential
Graduate

Optional (Student's choice)

Multiple Enrollment in same semester

NEW

Prefix PHYS Course# 304 Title ELECTROMAGNETISM
Units (4)
4 hours lecture per week
hours blank per week

X Prerequisites: PHYS 101 OR 201 AND MATH 250
Consent of Instructor Required for Enrollment
Corequisites:

Catalog Description (Do not use any symbols)**:** A calculus-based introduction to the concepts and principles of electricity and magnetism. Topics include: electrostatics, magnetism, electromagnetic theory, fields, electromagnetic waves, Maxwell's equations, and the Special Theory of Relativity. A strong emphasis will be on analytical problem-solving skills and applications.

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

Existing

	Units	Hours Per Unit	Benchmark Enrollment	Graded
Lecture	4	1	16	X
Seminar		1		
Lab		3		
Activity		2		
Field Studies				
Indep Study				
Other blank				

Proposed

	Units	Hours Per Unit	Benchmark Enrollment	Graded	CS No. (filled out by Dean)
Lecture	4	1	16	X	
Seminar		1			
Lab		3			
Activity		2			
Field Studies					
Indep Study					
Other blank					

3. Course Attributes:

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
- B-3 Mathematics – Mathematics and Applications
- 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)

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).

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

OLD

This course will be a requirement for the Physics major, when it is implemented, and will become an elective for the Applied Physics Minor. It may also be taken by Computer Science and Math majors.
Through this course, students will be able to
• explain the basic concepts and principles of electrostatics and electrodynamics
• describe the connection between electricity, magnetism and electromagnetic waves
• describe examples and applications of electricity and magnetism in everyday life
• apply problem-solving skills to practical problems in modern technology
• demonstrate the role of electricity and magnetism in other disciplines, and apply their understanding to these disciplines
• search and retrieve practical information
• use a variety of simulation programs, featuring data analysis and display, to derive conclusions about experimental situations
• organize and express ideas clearly and convincingly in oral and written forms.
Electromagnetic theory is illustrated with real-life applications in modern technology. Detailed examples are worked with step-by-step
explanations to help students develop their problem-solving strategies and skills and consolidate their understanding. In addition
to a meticulous development of traditional, analytical

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explanations to help students develop their problem-solving strategies and skills and consolidate their understanding. In addition
to a meticulous development of traditional, analytical

mathematical approaches, students are also introduced to a range of
techniques required for solving problems using computers. The course provides a preparation for students who plan more advanced studies in electrodynamics as well as those moving into industry or engineering.
The course does not meet the University Writing and/or Language requirements.

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Requirement for the Major/Minor
Elective for the Major/Minor
Free Elective

X Requirement for the Major/Minor
X Elective for the Major/Minor
Free Elective

Submit Program Modification if this course changes your program.

5. **Learning Objectives.** (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:

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

OLD

Vector analysis
Line and surface integrals
Electrostatics: charges, forces, fields, and potentials
Dielectrics and conductors: the interaction of materials with electrostatic charges.
Electric flux : calculations of flux for various geometries using direct integration and Gauss' Law.
Capacitance :calculating the electrostatic energy storage for parallel plates, cylinders, and spheres, with and without dielectric materials.
Magnetostatics : the source of magnetism and its connection with moving electrical charges.
Magnetic fields :determining the field for simple geometries using Biot-Savart Law and Ampere's law.
Magnetic :ferromagnetic, diamagnetic, and paramagnetic materials.
Electrodynamics :varying electric charge configurations and their associated fields.
Electromagnetic Induction :Lenz's law and the association between changing magnetic and electrostatic fields.
Self-inductance and mutual inductance :calculation of energy stored in magnetic fields.

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Maxwell Equations :the relationship between electricity, magnetism and light.
The special theory of relativity.
Electromagnetic waves :the solution to Maxwell's equations and the connection to light.
Electromagnetic Radiation :properties of light.
Plasmas : properties.
Superconductors: the foundation of modern electronics.
In addition to the basic concepts, a variety of interesting applications and examples will be covered in this course, such as: lightning, pacemakers, electric shock treatment, electrocardiograms, metal detectors, magnetic levitation, bullet trains, electric motors, radios, TV, Aurora Borealis, rainbows, radio telescopes, and mass spectrometers.

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

Overlapping courses require Chairs' signatures.

7. 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:**

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

OLD Foundations of Electromagnetic Theory. Reitz, J., Milford, F. and Christy, R., , 4th Ed, Addison-Wesley, 1993. (ISBN: 0-201-52624-7)
David J. Griffiths, Introduction to Electrodynamics (3rd Edition), Prentice Hall, 1999.
E.M. Purcell. Electricity and Magnetism. Berkeley Physics Course, Volume 2, Second Edition. McGraw-Hill ,1984. ISBN: 0070049084
Physics for Scientists and Engineers, 6th ed., Serway and Beichner. Harcourt.

NEW Foundations of Electromagnetic Theory. Reitz, J., Milford, F. and Christy, R., , 4th Ed, Addison-Wesley, 1993. (ISBN: 0-201-52624-7)
David J. Griffiths, Introduction to Electrodynamics (3rd Edition), Prentice Hall, 1999.
E.M. Purcell. Electricity and Magnetism. Berkeley Physics Course, Volume 2, Second Edition. McGraw-Hill ,1984. ISBN: 0070049084

9. Tenure Track Faculty qualified to teach this course.
Dr. Geoff Dougherty and Dr. Gregory G. Wood

10. Requested Effective Date or First Semester offered: Spring, 2011

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

A. Computer Needs (data processing, audio visual, broadcasting, other equipment, etc.)

B. Library Needs (streaming media, video hosting, databases, exhibit space, etc.)

C. Facility/Space/Transportation Needs:

D. Lab Fee Requested: Yes **No** X **(Refer to the Dean's Office for additional processing)**

E. Other.

12. Indicate Changes and Justification for Each. *[Check all 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
- X Prerequisites/Corequisites
- Catalog description
- Mode of Instruction
- Course Content
- Course Learning Objectives
- x References
- GE
- Other
- Reactivate Course

Justification: Vector calculus, MATH 250, is the basis of electromagnetism and all textbooks listed as references assume familiarity with vector calculus, with the exception of Serway's text, which is inapprorpriate for use in an upper division physics course and has been removed from the list. The Long Form for Applied Physics indicates MATH 250 is a prerequisite for PHYS 304 and this course modification aligns the course with the long form.

13. Will this course modification alter any degree, credential, certificate, or minor in your program? Yes x **No**

If, YES attach a program update or program modification form for all programs affected.
Priority deadline for New Minors and Programs: October 5, 2009 of preceding year.
Priority deadline for Course Proposals and Modifications: November 2, 2009.
Last day to submit forms to be considered during the current academic year: April 15th.

Gregory G. Wood — 11/1/2009

Proposer(s) of Course Modification — Date

Type in name. Signatures will be collected after Curriculum approval.

Approval Sheet

Course:

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.

Program Chair		
	Signature	Date
Program Chair		
	Signature	Date
Program Chair		
	Signature	Date
General Education Chair		
	Signature	Date
Center for Intl Affairs Director		
	Signature	Date
Center for Integrative Studies Director		
	Signature	Date
Center for Multicultural Engagement Director		
	Signature	Date
Center for Civic Engagement and Service Learning Director		
	Signature	Date
Curriculum Chair		
	Signature	Date
Dean of Faculty		
	Signature	Date