CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS
COURSE MODIFICATION PROPOSAL

Courses must be submitted by November 3, 2008, to make the next catalog (2009-2010) production

DATE (CHANGE DATE EACH TIME REVISED): DEC 2, 2009; REV 1.25.10
PROGRAM AREA(S): MATH, PHYSICS

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

1. Course Information.
   [Follow accepted catalog format.] (Add additional prefixes if cross-listed)

<table>
<thead>
<tr>
<th>OLD</th>
<th>NEW</th>
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</thead>
<tbody>
<tr>
<td>Prefix MATH</td>
<td>Course# 437</td>
</tr>
<tr>
<td>3 hours lecture per week</td>
<td>3 hours lecture per week</td>
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</tbody>
</table>

Prerequisites: Math 137 or Math 300 or Consent of Instructor
Consent of Instructor Required for Enrollment
Corequisites: 

Catalog Description (Do not use any symbols): This course covers the application of basic algebra, Newtonian physics, computational mechanics, linear algebra, probability, and differential equations to game development and computer graphics. Applicable algorithms and techniques are demonstrated through appropriate computer gaming examples.

Catalog Description (Do not use any symbols): Covers the application of basic algebra, Newtonian physics, computational mechanics, linear algebra, probability, and differential equations to game development, simulations and robotics. Project based course wherein concepts are demonstrated by student teams using game engines, 3D graphics tools, and robots.

2. Mode of Instruction (Hours per Unit are defaulted)

<table>
<thead>
<tr>
<th>Existing</th>
<th>Proposed</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>Lecture</td>
</tr>
<tr>
<td>Units</td>
<td>Units</td>
</tr>
<tr>
<td>Hours Per Unit</td>
<td>Hours Per Unit</td>
</tr>
<tr>
<td>Benchmark Enrollment</td>
<td>Benchmark Enrollment</td>
</tr>
<tr>
<td>Graded</td>
<td>Graded</td>
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</tbody>
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Hegis Code(s) (Provided by the Dean)
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](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](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**
   - Meets a missing knowledge requirement for the Game Minor
   - Requirement for the Major/Minor
   - Elective for the Major/Minor
   - Free Elective

   **NEW**
   - Meets a missing knowledge requirement for the Game Minor; covers important material in Physics, Computer Science, Computer Engineering, and Graphic Art not taught in any other class.
   - Requirement for the Major/Minor
   - Elective for the Major/Minor
   - Free Elective

Submit Program Modification if this course changes your program.

5. Learning Objectives. (List in numerical order)

   **OLD**
   - Analyze games and various strategies
   - Construct and apply gaming algorithms
   - Implement mathematical ideas into gaming algorithms on computers
   - Apply mathematics in game development
   - Use basic mathematics of motion
   - Analyze complexity of games
   - Relate artistic, programming and mathematical gaming concepts and techniques
   - Write stories related to computer game environment

   **NEW**
   - Analyze games and various strategies
   - Construct and apply gaming algorithms and simulations
   - Implement mathematical ideas into gaming algorithms and robotics
   - Apply mathematics in game and algorithm development

9.15.08 km²
Express related ideas in oral and written form
Use mathematics of motion in various contexts
Analyze complexity of games and algorithms
Synthesize artistic, programming and mathematical gaming concepts and techniques
Write stories related to computer game environment
Express related ideas in oral and written form including technical documentation

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

OLD
Introduces and/or reviews:
- algebra, linear algebra, probability, and differential equations
- Newtonian physics and computational mechanics

Demonstrates and applies this material to game development and computer graphics

NEW
Introduces and/or reviews:
- algebra, linear algebra, probability, and differential equations
- Newtonian physics and computational mechanics

- image visibility math and consequences
- numerical estimation and interpolation

Applies material, through student projects, to real-time games and simulations, and live robot vision/motion

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  The geometry of Physics, by Theodore Frankel, Cambridge University Press, (1997)

NEW The geometry of Physics, by Theodore Frankel, Cambridge University Press, (1997)
9. Tenure Track Faculty qualified to teach this course. 
   Ivona Grzegorczyk, Geoff Dougherty, William Wolfe, Andrzej Bieszczad,

10. Requested Effective Date or First Semester offered:  Fall 2010

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

    A. Computer Needs (data processing, audio visual, broadcasting, other equipment, etc.)
       Existing PC labs, overhead projector w/PC, robotics
    B. Library Needs (streaming media, video hosting, databases, exhibit space, etc.)
       Existing
    C. Facility/Space/Transportation Needs:
       N/A
    D. Lab Fee Requested: Yes ☒  No ☒  (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.]

    X Course title
    Prefix/suffix
    Course number
    Units
    Staffing formula and enrollment limits
    Prerequisites/Corequisites
    X Catalog description
    Mode of Instruction

    Justification:  Extends the title to better reflect applicability of material taught.  Aligns catalog description with actual material taught and learning objectives are updated.  Course content was more closely aligned with industry requirements.

13. Will this course modification alter any degree, credential, certificate, or minor in your program?  Yes ☒  No ☒
    If YES attach a program update or program modification form for all programs affected.
    Priority deadline for New Minors and Programs: October 6, 2008 of preceding year.
    Priority deadline for Course Proposals and Modifications: November 3, 2008.
    Last day to submit forms to be considered during the current academic year: April 15th.

Ivona Grzegorczyk, Ron Rieger
Sept 1, 2009

Proposer(s) of Course Modification
Date

Type in name.  Signatures will be collected after Curriculum approval.
Request for MATH 437: Mathematics for Games, Simulations, and Robotics to be added to GE Category B3: Mathematics

Committee Response: Approved by committee on 01-20-2010

Criteria and Justifications Submitted:

- **Promote the understanding and appreciation of the methodologies of math or science as investigative tools and the limitations of mathematical or scientific endeavors**
  This course covers the modern applications of mathematics to computers and robotics, uses physics, computer science and engineering and goes across other disciplines (such as education, sciences, story writing) in project development. This is a project based class where concepts are demonstrated by student teams using game engines, 3D graphics tools, and robots.
- **Present mathematical or scientific knowledge in a historical perspective and the influences of math and science on the development of world civilizations, both past and present**
  The course includes past and modern history and culture related to mathematics, computer modeling and applications.
- **Apply inductive and deductive reasoning processes and explore fallacies and misconceptions in the mathematical or scientific areas**
  Students will use algebra, calculus, Newtonian physics, computational mechanics, linear algebra, probability, and differential equations to game development, simulations and robotics.
- **Promote an understanding of mathematical ideas and problem solving skills**
  This course is project and problem solving based in the contexts of game design and simulations.

Request for MATH 437: Mathematics for Games, Simulations, and Robotics to be added to GE Category UDIGE:

Committee Response: Approved by committee on 01-20-2010

Criteria and Justifications Submitted:

- **Emphasize interdisciplinarity by integrating content, ideas, and approaches from two or more disciplines**
  This course integrates mathematics, computers and robotics, and physics, computer science and engineering knowledge and goes across other disciplines (such as education, sciences, story writing) in project development.
- **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.**
Course includes substantive written work consisting of in-class writing as well as outside class writing of game story lines and dialogs, progress reports, documentation, project evaluations and analysis.
Approval Sheet

Course: **Math 437**

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.

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<thead>
<tr>
<th>Chair Position</th>
<th>Signature</th>
<th>Date</th>
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<tbody>
<tr>
<td>Program Chair</td>
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<td>General Education Chair</td>
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<tr>
<td>Center for Intl Affairs Director</td>
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<td>Center for Integrative Studies Director</td>
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<td>Center for Multicultural Engagement Director</td>
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<td>Center for Civic Engagement and Service Learning Director</td>
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<td>Curriculum Chair</td>
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<tr>
<td>Dean of Faculty</td>
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