NEW COURSE PROPOSAL

DATE   DECEMBER 16, 2005
PROGRAM AREA   MATHEMATICS

1. **Catalog Description of the Course.** *[Follow accepted catalog format.]*

    Prefix MATH **Course#** 437 **Title** . Mathematics for Game Development **Units** (3)
    3 **hours** Lecture **per week**
    ☒ **Prerequisites** Math 137 or Math 300
    ☐ **Corequisites** none
    Description 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.

    Three hours lecture in a computer lab

	Graded	
☒ **Gen Ed**	☐ **CR/NC**	☐ **Repeatable for up to** units
Categories B3, UDIGE		
☐ **Lab Fee Required**	☒ **A - F**	**Total Completions Allowed**
	☐ **Optional (Student's choice)**	☐ **Multiple Enrollment in same semester**

2. **Mode of Instruction.**

	Units	**Hours per Unit**	**Benchmark Enrollment**	**Graded Component**	**CS #** (filled in by Dean)
Lecture	3	1	24	☒	
Seminar				☐	
Laboratory				☐	
Activity				☐	

3. **Justification and Learning Objectives for the Course.** (Indicate whether required or elective, and whether it meets University Writing, and/or Language requirements) *[Use as much space as necessary]*
    Justification: The course is an elective course in COMPUTER GAMING MINOR an elective for Mathematics and CS majors. It is taught in a computer lab.

    This course is writing intensive and is designed to satisfy the University Upper Division Writing requirements.

    Learning Objectives:
    Upon completion of this course students will be able to:
    (Press enter for the next bulleted item)

    •   Analyze games and various strategies
    •   Construct and apply simple gaming algorithms
    •   Implement mathematical ideas into gaming algorithms on computers
    •   Apply basic 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.
    •   Express related ideas in oral and written form.

4. **Is this a General Education Course**   **YES** ☒   **NO** ☐
    If Yes, indicate GE category and attach GE Criteria Form:

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) ☐
UD Interdisciplinary ☒

5. **Course Content in Outline Form.** *[Be as brief as possible, but use as much space as necessary]*
(Press enter for the next bulleted item)

- Mathematical background in computer games
- Theoretical game design
- Basic algebra and equations in computer graphics
- Newtonian physics and motion
- Computational mechanics
- Differential equations and computer models
- Linear algebra for rotations and movement
- Probability and underling graphs in computer games
- Gaming algorithms and techniques
- Writing and rewriting stories related to computer game environment.
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Does this course overlap a course offered in your academic program? YES ☐ NO ☒
If YES, what course(s) and provide a justification of the overlap?

Does this course overlap a course offered in another academic area? YES ☐ NO ☒
If YES, what course(s) and provide a justification of the overlap?
Signature of Academic Chair of the other academic area is required on the consultation sheet below.

6. **Cross-listed Courses (Please fill out separate form for each PREFIX)**
List Cross-listed Courses

Signature of Academic Chair(s) of the other academic area(s) is required on the consultation sheet below

Department responsible for staffing:

7. **References.** *[Provide 3 - 5 references on which this course is based and/or support it.]*
(Press enter for the next number)

The geometry of Physics, by Theodore Frankel, Cambridge Univerity Press, (1997)
3D Math Primer for Graphics and Game Development, Fletcher Dunn and Ian Parberry, Wordware Publishing, INC. (2002)
Mathematics for 3D game Programming and Computer Graphics by Eric Engyel, Game Development series, Charles River Media INC, (2002).
Curves and Surface in Geometric Modeling, by Jean Gallier, Morgan Kaufamn Publishers (2000) .
Interactive Story Writing in the Classroom: Using Computer Games (2005) Mike Carbonaro, et al., CiteSeer, Digital Library.

8. **List Faculty Qualified to Teach This Course.**

   Mathematics Faculty

9. **Frequency.**
   a. Projected semesters to be offered: Fall ⊠   Spring ⊠   Summer ☐

10. **New Resources Required. YES ☐ NO ⊠**
    If YES, list the resources needed and obtain signatures from the appropriate programs/units on the consultation sheet below.

    a. Computer (data processing), audio visual, broadcasting needs, other equipment)

    b. Library needs
    Gaming resources

    c. Facility/space needs
    existing labs

11. **Will this new course alter any degree, credential, certificate, or minor in your program? YES ☐ NO ⊠**
    If, YES attach a program modification form for all programs affected.

    Ivona Grzegorczyk, Jorge Garcia   9/12/2005
    Proposer of Course   Date

Approvals

_____
Program Chair   Date

_____
General Education Committee Chair   Date

_____
Curriculum Committee Chair   Date

_____
Dean   Date

GE CRITERIA APPROVAL FORM

Course Number and Title: **MATH 437** . Mathematics for Game Development **(3)**

Faculty member(s) proposing Course: Ivona Grzegorczyk, Prof. of Mathematics, Jorge Garcia Assistant Prof. of Mathematics

Indic ate which of the following GE would be satisfied by this course by marking an "X" on the appropriate lines.
Courses may be placed in up to *two* GE categories as appropriate. Upper Division Interdisciplinary GE courses (UDIGE) may be placed in two GE categories in addition to the UDIGE category.

	GE Category	
	A1:	Oral Communication
	A2:	English Writing
	A3:	Critical Thinking
	B1:	Physical Sciences—Chemistry, Physics, Geology, and Earth Sciences
	B2:	Life Sciences—Biology
x	B3	Mathematics—Mathematics and Applications
	B4	Computers and Information Technology
	C1	Art
	C2:	Literature
	C3a:	Language
	C3b:	Multicultural
	D:	Social Perspectives
	E:	Human Physiological and Psychological Perspectives
x	Upper Division Interdisciplinary GE	
	Lab Included? Yes ___x___ No _____	

B3: in this course student will
    1. use mathematical/statistical methods in gaming;
    2. select, apply and interpret strategies and methods in an appropriate fashion;
    3. use mathematical and physical modeling and algorithms in computer games context.

Interdisciplinary course
  1. Integrates content, ideas and approaches used in mathematics, physics, computer science and fine arts.
  2. Relates artistic, programming and mathematical gaming concepts and techniques.
  3. Includes writing storylines associated to games in English. Written assignments will be evaluated by teams and instructors, coordinated with various tasks, quality assurance tested, compared to other stories. One of the goals would be to improve overall creative writing and plot development skills.