

NEW COURSE PROPOSAL

PROGRAM AREA MATHEMATICS

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

Prefix MATH **Course#** 137 **Title** . STRATEGIES AND GAME DESIGN **Units** (3)

3 hours Lecture **per week**

☒ **Prerequisites** A passing score on the Entry Level Mathematics Examination

☐ **Corequisites** none

Description This course introduces mathematics to the analysis of games. The principles of game theory including graphs, logic, algebra, geometry and probability are connected to game design, computer graphics and game strategies in various contexts. Applicable algorithms and techniques are demonstrated through appropriate computer gaming examples.

☒ **Gen Ed**

Categories B3

☐ **Lab Fee Required**

Graded

☐ **CR/NC**

☐ **Repeatable for up to** **units**

☒ **A - F**

☐ **Optional** (Student's
choice)

Total Completions Allowed

☐ **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 a required course in COMPUTER GAMING MINOR. Meets GE B3 requirement.

Learning Objectives:

Upon completion of this course students will be able to:

(Press enter for the next bulleted item)

Through this course, students will be able to

- Analyze games and various strategies
- Construct and apply simple gaming algorithms
- Implement mathematical ideas into gaming algorithms on computers
- Use basic mathematics of motion
- Analyze complexity of games
- Relate artistic, programming and mathematical gaming concepts and techniques
- Express related ideas in oral and written form.

This course is not designed to satisfy the University Writing or Language requirements.

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)

- The principles of game theory
- Simple games (coin tossing, roulette, 21)
- Complex games (cards, checkers, and chess)
- Applications to economics, property division, politics, warfare.
- Graphics in game design
- Logic and strategies
- Algebra and movement
- Geometry and computer graphics
- Probability and game design
- Game strategies in various contexts.
- Gaming algorithms and techniques
- Computer games

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)

Berlekamp, E. R.; Conway, J. H; and Guy, R. K. Winning Ways for Your Mathematical Plays, Vol. 1: Adding Games, 2nd ed. Natick, MA: A. K. Peters, 2001.

Berlekamp, E. R.; Conway, J. H; and Guy, R. K. Winning Ways for Your Mathematical Plays, Vol. 2: Games in Particular. London: Academic Press, 1982.

Conway, J. H. On Numbers and Games, 2nd ed. Natick, MA: A. K. Peters, 2000.

Dresher, M. The Mathematics of Games of Strategy: Theory and Applications. New York: Dover, 1981.

Gardner, M. "Game Theory, Guess It, Foxholes." Ch. 3 in Mathematical Magic Show: More Puzzles, Games, Diversions, Illusions and Other Mathematical Sleight-of-Mind from Scientific American. New York: Vintage, pp. 35-49, 1978.

Gardner, R. Games for Business and Economics. New York: Wiley, 1994.

Isaacs, R. Differential Games: A Mathematical Theory with Applications to Warfare and Pursuit, Control and Optimization. New York: Dover, 1999.

Kuhn, H. W. (Ed.). Classics in Game Theory. Princeton, NJ: Princeton University Press, 1997.

Mérö, L. Moral Calculations: Game Theory, Logic and Human Frailty. New York: Springer-Verlag, 1998.

Stahl, S. A Gentle Introduction to Game Theory. Providence, RI: Amer. Math. Soc., 1999.

Straffin, P. D. Jr. Game Theory and Strategy. Washington, DC: Math. Assoc. Amer., 1993.

Williams, J. D. The Compleat Strategyst, Being a Primer on the Theory of Games of Strategy. New York: Dover, 1986. .

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 Grzegorzczuk, Jorge Garcia

Proposer of Course

9/12/2005

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 137 Strategies and game design

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

Indicate 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
☒	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
☐	Upper Division Interdisciplinary GE
Lab Included? Yes ☒ No ☐	

Please provide a brief explanation of how the proposed course meets *each* of the criteria for the selected GE categories.

B3

- Mathematical modeling of situations in games and analysis of underlying logical structure.
- Introduction to deductive and inductive reasoning, strategies and algorithms
- Introduction to the rigorous foundations of basic mathematical applications in games.
- Problem solving and game design
- Study of graphs, logic, algebra, geometry and probability in game design, computer graphics.