CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

NEW COURSE PROPOSAL

PROGRAM AREA _____

1. **Catalog Description of the Course.** *[Include the course prefix, number, full title, and units. Provide a course narrative including prerequisites and corequisites. If any of the following apply, include in the description: Repeatability (May be repeated to a maximum of ___ units); time distribution (Lecture ___ hours, laboratory ___ hours); non-traditional grading system (Graded CR/NC, ABC/NC). Follow accepted catalog format.]*

   MATH 450. PARTIAL DIFFERENTIAL EQUATIONS AND MATHEMATICAL PHYSICS (3)

   Prerequisites: MATH 350 or consent of instructor.

   Topics include: vector field theory and Fourier analysis.

2. **Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment
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]*

   This course is an elective for Mathematics majors.

After completing this course student will be able to:

* Apply and solve ordinary differential equations, such as those of classical mechanics.
* Apply and solve numerically partial differential equations, such as Maxwell's equations and the Diffusion and Schrödinger equations.
* Demonstrate skills in various methods of equations solving, including matrices, eigenvalues, electronic structure calculations.
* Apply Monte Carlo and other simulation methods
* Demonstrate skills in Computer Algebra uses in physics.

4. **Is this a General Education Course** **NO**

   If Yes, indicate GE category:

A (English Language, Communication, Critical Thinking)	
B (Mathematics & Sciences)	
C (Fine Arts, Literature, Languages & Cultures)	
D (Social Perspectives)	
E (Human Psychological and Physiological Perspectives)	
INTERDISCIPLINARY	

5. **Course Content in Outline Form.** *[Be as brief as possible, but use as much space as necessary]*

* Elliptic Equations -- Laplace's equation
* Hyperbolic Equations -- Wave equations

* Non-Linear Equations
* Hyperbolic Equations
* Eulerian and Lagrangian Methods
* Parabolic Equations -- Diffusion
* The Dufort-Frankel Method
* Conservative Methods
* The Equation of Continuity
* The Diffusion Equation
* Maxwell's Equations
* Dispersion Lagrangian Fluid Code
* The Difference Equations
* Boundary Conditions
* Initial Conditions
* Solitons
* Discretisation

6. References. *[Provide 3 - 5 references on which this course is based and/or support it.]*

PARTIAL DIFFERENTIAL EQUATIONS OF FIRST ORDER AND THEIR APPLICATIONS TO PHYSICS, by Gustavo López (1999), World Scientific Publishing, ISBN 981-02-3746-4.

7. List Faculty Qualified to Teach This Course.
All Mathematics faculty

8. Frequency.
a. Projected semesters to be offered: Fall __X___ Spring __X___ Summer _____

9. New Resources Required.
a. Computer (data processing), audio visual, broadcasting needs, other equipment

Access to computer labs required

b. Library needs
No additional needs

c. Facility/space needs

Classroom.

10. Consultation.
Attach consultation sheet from all program areas, Library, and others (if necessary)

11. If this new course will alter any degree, credential, certificate, or minor in your program, attach a program modification.

_____

Proposer of Course Date