

CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

NEW COURSE PROPOSAL

PROGRAM AREAS MATH

- 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 393 ABSTRACT ALGEBRA (3)

Three hours of lecture per week.

Prerequisite: MATH 300.

Topics include: groups, rings, modules, fields and their extensions, Galois Theory.

- 2. Mode of Instruction.**

| | Units | Hours per Unit | Benchmark Enrollment |
|------------|---------------|----------------|----------------------|
| Lecture | <u> 3 </u> | <u> 1 </u> | <u> 24 </u> |
| Seminar | <u> </u> | <u> </u> | <u> </u> |
| Laboratory | <u> </u> | <u> </u> | <u> </u> |
| Activity | <u> </u> | <u> </u> | <u> </u> |

- 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]*

The course is an elective for Mathematics majors.

Through this course, students will be able to

- Discuss the basic algebraic structures appearing in mathematics today
- Apply the knowledge of these structure to the analysis of concrete special cases
- Compute degrees of extensions
- Prove impossibility of certain ruler and compass geometric constructions, e.g. squaring of the circle
- Parametrize field extensions by groups and vice-versa
- Determine the solvability of higher degree polynomial equations by radicals.
- Express concepts and techniques of Abstract Algebra 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:

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

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

Groups: Basic properties, Subgroups, group homomorphisms, normal subgroups, index, isomorphism theorems,

Rings: Ideals, Quotient rings, Polynomial rings,

Modules: Definition, Quotient modules, basic isomorphisms

Fields: Basic structures, field extensions, degree of extension, Tower Theorem, applications to geometric constructions

Galois Theory: Galois groups and fields, Fundamental Theorem of Galois Theory, application to polynomial equations.

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

Abstract Algebra, an Introduction, Thomas W. Hungerford, Saunders College Publishing, (second edition) 1997.

7. List Faculty Qualified to Teach This Course.

Ivona Grzegorzczuk, Nikolaos Diamantis, 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

None

b. Library needs

None

c. Facility/space needs

None

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