Glendale College

Course Outline of Record Report

Course ID 010656

Revision - September 2024

MATH109 : A Survey of Abstract Algebra

General Information

Author:	• Suzanne Palermo • Djrbashian, Ashot
Course Code (CB01) :	MATH109
Course Title (CB02) :	A Survey of Abstract Algebra
Department:	MATH
Proposal Start:	Fall 2025
TOP Code (CB03) :	(1701.00) Mathematics, General
CIP Code:	(27.0101) Mathematics, General.
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000642844
Curriculum Committee Approval Date:	09/25/2024
Board of Trustees Approval Date:	12/17/2024
Last Cyclical Review Date:	12/13/2023
Course Description and Course Note:	MATH 109 is a survey course designed to expose students to the theory of algebraic equations and the basic notions of abstract algebra. Students will be provided with an overview of sets, groups, rings, fields, and vector spaces.
Justification:	Content Change
Academic Career:	• Credit
Mode of Delivery:	No value
Author:	No value
Course Family:	No value

Academic Senate Discipline

Primary Discipline:	• Mathematics
Alternate Discipline:	No value
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

☐ Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

Not applicable.

Grading Basis

- Grade with Pass / No-Pass Option

Course Support Course Status (CB26)

Course is not a support course

General Education and C-ID

General Education Status (CB25)

Not Applicable

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

CSU GE-Breadth Area	Area	Status	Approval Date	Comparable Course
B4-Mathematics/Quantitative Reasoning	Mathematics/Quantitative Reasoning	Denied	09/03/2024	No Comparable Course defined.

IGETC Area	Area	Status	Approval Date	Comparable Course
2-Math	Mathematical Concepts and Quantitative Reasoning	Pending	No value	UCI - MATH 13

Cal-GETC	Area	Status	Approval Date	Comparable Course
Area 2: Mathematical Concepts and Quantitative Reasoning	Mathematical Concepts and Quantitative Reasoning	Pending	No value	No Comparable Course defined.

Units and Hours

Summary

Minimum Credit Units (CB07)	3
Maximum Credit Units (CB06)	3
Total Course In-Class (Contact) Hours	54
Total Course Out-of-Class Hours	108
Total Student Learning Hours	162

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	3	6
Laboratory Hours	0	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	54
Laboratory	0
Studio	0
Total	54
Course Out-of-Class Hours	
Lecture	108
Laboratory	0
Studio	0
Total	108

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

MATH104E - Calculus and Analytic Geometry II

Objectives

- Evaluate definite and indefinite integrals using a variety of techniques, including integration by parts, trigonometric substitution, and partial fractions.

- Graph conic sections.
- Graph equations in polar and parametric form.

Entry Standards

Entry Standards	Description
Solve algebraic equations.	No Value
Apply the Fundamental Theorem of Algebra and related theorems to find the roots of a polynomial.	No Value

Course Limitations

Cross Listed or Equivalent Course	Description
No value	No value

Specifications

Methods of Instruction

Methods of Instruction	
Methods of Instruction	Lecture
Methods of Instruction	Presentations
Methods of Instruction	Discussion

Out of Class Assignments

- Homework assignments (e.g. problem sets related to course content)
- Group or individual projects (e.g. solving more challenging problems from other sources and applications of the underlying theory)
- Reading assignments (e.g. reading biographies of the principal creators of the theory Niels Henrik Abel and Evariste Galois)

Methods of Evaluation	Rationale
Exam/Quiz/Test	Quizzes

Exam/Quiz/Test	Three to four regularly scheduled exams
Exam/Quiz/Test	Comprehensive final examination

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Djrbashian, Ashot	From Polynomial Equations to Galois Theory	Yerevan, Zangak Publications	2022	9939684134

Other Instructional Materials (i.e. OER, handouts)

No Value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Prove and apply basic results about solving algebraic equations.

Use basic notions of set theory, including cardinality of sets.

Evaluate differences among basic algebraic structures: groups, rings, integral domains, ideals, vector spaces, and fields.

Apply the notion of field extension and solvable groups to determine solvability of algebraic equations.

SLOs

Distinguish between different types of algebraic structures (groups, rings, fields, vector spaces) and prove statements related to them.
Expected Outcome Performance: 70.0

Apply basic notions of field extensions and solvable groups to determine solvablility by radicals. Expected Outcome Performance: 70.0

Additional SLO Information

Does this proposal include revisions that might improve student attainment of course learning outcomes?

No

Is this proposal submitted in response to learning outcomes assessment data?

No

If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.

No Value

SLO Evidence

No Value

Course Content

Lecture Content

Review of Solutions of Equations and Mathematical Proofs (10 hours)

- Solutions of equations of degree three and higher
- Trigonometric form of complex numbers and roots of unity
- Basic rules of logic, truth tables, and methods of proofs
- Operations on sets: unions, intersections, difference, cardinality of a set

Groups (15 hours)

- Definitions and simplest examples of groups
- Properties of groups, subgroups, and factor groups
- Permutations: the symmetric and alternating groups

Rings, Fields, Vector Spaces (14 hours)

- Definitions of rings and fields, and simplest examples
- An overview of vector spaces, linear independence and bases
- Field extensions, the main ideas

Solvability of Algebraic Equations (15 hours)

- The reasons for solvability
- Solvable groups and field extensions
- Application of field extensions to solvability of equations

Total hours: 54

Additional Information

Is this course proposed for GCC Major or General Education Graduation requirement? If yes, indicate which requirement in the two areas provided below.

Yes

GCC Major Requirements

Mathematics

GCC General Education Graduation Requirements

Communication and Analytical Thinking

Repeatability

Not Repeatable

Justification (if repeatable was chosen above)

No Value

Resources

Did you contact your departmental library liaison?

No

If yes, who is your departmental library liason?

No Value

Did you contact the DEIA liaison?

No

Were there any DEIA changes made to this outline?

No

If yes, in what areas were these changes made:

No Value

Will any additional resources be needed for this course? (Click all that apply)

- No

If additional resources are needed, add a brief description and cost in the box provided.

No Value