Math 315 Introduction to Modern Algebra

Credit Hours: 3
Scheduled hours per week
Lecture: 3
Lab: 0
Other: 0

Catalog Course Description: An introduction to abstract algebra and modern mathematical thinking. Topics include: group properties, subgroups, Lagrange's theorem, cosets, permutations, normal subgroups, homomorphisms, and rings.

Pre-requisites: C or better in Math 121 and Math 126

Co-requisites: None

Course Learning Outcomes:

1. Students will demonstrate ability to work with modular systems.
2. Students will demonstrate knowledge of relations and establish if they are equivalence relations.
3. Students will demonstrate knowledge of group properties and determine if a set with an associated binary operation is a group.
4. Students will demonstrate ability to identify, classify, and generate various cyclic groups.
5. Students will demonstrate ability to identify subgroups, know their properties, and to prove and use relative theorems.
6. Students will demonstrate ability to work with symmetric and permutation groups.
7. Students will demonstrate ability to form cosets, and establish isomorphisms and homomorphisms.
8. Students will demonstrate knowledge of rings, integral domains, fields, and be able to identify subrings and ideals.
9. Students will demonstrate ability to write a rigorous proof.

Topics to be studied:

Properties of integers
Modular systems
Binary operations
Mathematical induction
Relations
Equivalence relations
Groups: definition and properties
Abelian groups
Ideals
Cayley's theorem
Cosets
Lagrange's theorem
Rings
Subrings
Integral domains
Fields
Symmetric groups, Finite groups, Cyclic groups, Permutations, Subgroups, Isomorophisms
Homomorphisms

Relationship of Course to Program or Discipline Learning Outcomes:

(What program outcomes are being met by this course?
For general education courses, a listing of the general education competencies that are met.)

Relationship of Course to Mathematics (MATH) Student Learning Outcomes:	
Demonstrate understanding of the language of mathematics, by their use of symbols, definitions, word phrases, and representations.	x
Display proficiency in mathematical computations.	x
Implement mathematical techniques to solve applied problems.	x
Employ appropriate technology to demonstrate knowledge of mathematical concepts.	x
Exhibit mastery of core course competencies.	x
10/20/2017	

Relationship of Course to General Education Learning Outcomes:	
Composition and Rhetoric Students illustrate a fundamental understanding of the best practices of communicating in English and meet the writing standards of their college or program-based communication requirements.	
Science & Technology Students successfully apply systematic methods of analysis to the natural and physical world, understand scientific knowledge as empirical, and refer to data as a basis for conclusions.	
Mathematics & Quantitative Skills Students effectively use quantitative techniques and the practical application of numerical, symbolic, or spatial concepts.	x
Society, Diversity, & Connections Students demonstrate understanding of and a logical ability to successfully analyze human behavior, societal and political organization, or communication.	
Human Inquiry & the Past Students interpret historical events or philosophical perspectives by identifying patterns, applying analytical reasoning, employing methods of critical inquiry, or expanding problem-solving skills.	
The Arts & Creativity Students successfully articulate and apply methods and principles of critical and creative inquiry to the production or analysis of works of art.	
5/3/2016	

Special requirements of the course: None

Additional information: None

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