SULLAMUSSALAM SCIENCE COLLEGE, AREEKODE

M Sc Mathematics

Programme Specific Outcomes

- Solve problems in the advanced areas of numerical analysis, linear algebra, and real analysis.
- Read, analyze, and write logical arguments to prove mathematical concepts.
- Communicate mathematical ideas with clarity and coherence, both written and verbally.
- Perform research in conjunction with others as well as individually.

Course Outcome of Algebra- I

Students will be able to

- Students will have a working knowledge of important mathematical concepts in abstract algebra such as definition of a group, order of a finite group and order of an element.
- Students will be knowledgeable of different types of subgroups such as normal subgroups, cyclic subgroups and understand the structure and characteristics of these subgroups.
- Students will be introduced to and have knowledge of many mathematical concepts studied in abstract mathematics such as permutation groups, factor groups and Abelian groups.
- Students will see and understand the connection and transition between previously studied mathematics and more advanced mathematics. The students will actively participate in the transition of important concepts such homomorphisms & isomorphisms from discrete mathematics to advanced abstract mathematics.

- Students will gain experience and confidence in proving theorems. A blended teaching method will be used requiring the students to prove theorems give the student the experience, knowledge, and confidence to move forward in the study of mathematics.

Course Outcome of Linear Algebra

Students will be able to

- Use computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, orthogonality and diagonalization. (Computational and Algebraic Skills).
- Use visualization, spatial reasoning, as well as geometric properties and strategies to model, solve problems, and view solutions, especially in R^2 and R^3, as well as conceptually extend these results to higher dimensions. (Geometric Skills).
- Use technology, where appropriate, to enhance and facilitate mathematical understanding, as well as an aid in solving problems and presenting solutions (Technological Skills).
- Communicate and understand mathematical statements, ideas and results, both verbally and in writing, with the correct use of mathematical definitions, terminology and symbolism (Communication Skills).
- Critically analyze and construct mathematical arguments that relate to the study of introductory linear algebra. (Proof and Reasoning).
- Work collaboratively with peers and instructors to acquire mathematical understanding and to formulate and solve problems and present solutions (Collaborative Skills).

Course Outcome of Real Analysis- I

Students will be able to

- Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
- Comprehend regions arguments developing the theory underpinning real analysis.
- Demonstrate an understanding of limits ad how that are used in sequences, series and differentiation.
- Construct rigorous mathematical proofs of basic results in real analysis.
- Appreciate how abstract ideas and regions methods in mathematical analysis can be applied to important practical problems.

Course Outcome of Number Theory

Students will be able to

- Prove results involving divisibility and greatest common divisors.
- Solve systems of linear congruences.
- Find integral solutions to specified linear Diophantine Equations.
- Apply Euler-Fermat's Theorem to prove relations involving prime numbers.
- Apply the Wilson's theorem.

Course Outcome of Algebra- II

Students will be able to

- Explain the fundamental concepts of field extensions and Galois theory and their role in modern mathematics and applied contexts.
- Demonstrate accurate and efficient use of field extensions and Galois theory.
- Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from field extensions and Galois theory.
- Apply problem-solving using field extensions and Galois theory applied to diverse situations in physics, engineering and other mathematical contexts.

Course Outcome of Real Analysis- II

Students will be able to

- Students will understand the fundamentals of measure theory and be acquainted with the proofs of the fundamental theorems underlying the theory of integration
- They will also have an understanding of how these underpin the use of mathematical concepts such as volume, area, and integration.
- They will develop a perspective on the broader impact of measure theory in ergodic theory and have the ability to pursue further studies in this and related area.
- Explain the concept of length, area, volume using Lebesgue's theory.
- Apply the general principles of measure theory and integration in such concrete subjects as the theory of probability or financial mathematics.

Course Outcome of Topology

Students will be able to

- Understand terms, definitions and theorems related to topology.
- Demonstrate knowledge and understanding of concepts such as open and closed sets, interior, closure and boundary.
- Create new topological spaces by using subspace, product and quotient topologies.
- Use continuous functions and homeomorphisms to understand structure of topological spaces.
- Demonstrate knowledge and understanding of metric spaces.
- Apply theoretical concepts in topology to understand real world applications.

Course Outcome of ODE and Calculus of Variation

Students will be able to

- Analyze real world scenarios to recognize when ordinary differential equations (ODEs) or systems of ODEs are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the results.
- Recognize ODEs and system of ODEs concepts that are encountered in the real world, understand and be able to communicate the underlying mathematics involved to help another person gain insight into the situation.
- Work with ODEs and systems of ODEs in various situations and use correct mathematical terminology, notation, and symbolic processes in order to engage in work, study, and conversation on topics involving ODEs and systems of ODEs with colleagues in the field of mathematics, science or engineering.

Course Outcome of Complex Analysis

Students will be able to

- Perform basic algebraic manipulation with complex numbers.
- Understand the geometric interpretation of complex numbers.
- Know methods of finding the nth roots of complex numbers and the solutions of simple polynomial equations.
- Use analytical functions and conformal mappings.
- Compute definite integrals using residue calculus.
- Appreciate the existence of special functions and their use in a range of contexts.

Course Outcome of PDE and Integral Equations

Students will be able to

- Apply a range of techniques to find solutions of standard Partial Differential Equations (PDE)
- Understand basic properties of standard PDE's.
- Demonstrate accurate and efficient use of Fourier analysis techniques and their applications in the theory of PDE's.
- Demonstrate capacity to model physical phenomena using PDE's (in particular using the heat and wave equations).
- Apply problem-solving using concepts and techniques from PDE's and Fourier analysis applied to diverse situations in physics, engineering, financial mathematics and in other mathematical contexts.