GDC Memorial College, Bahal (Bhiwani)
Department of Mathematics
2018-19 (Odd)

Learning Objective & Outcomes
M.Sc. (Mathematics) 1st Semester

Subject: Abstract Algebra-I   **Subject Code: MTH-101**

Learning Objective

1. Present the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers.

2. Present concepts of and the relationships between operations satisfying various properties (e.g. commutative property).

3. Present concepts and properties of various algebraic structures.

4. Discuss the importance of algebraic properties relative to working within various number systems.

5. Develop the ability to form and evaluate conjectures.

Learning Outcomes

After the completion of the course, Students will be able to

1. Generate groups given specific conditions.

2. Investigate symmetry using group theory.

3. Identify plane periodic patterns (lattices).

4. Understand the base of the coding theory as an application of finite fields.

5. Demonstrate knowledge that the rational numbers and real numbers can be ordered and that the complex numbers cannot be ordered, but that any polynomial equation with real coefficients can be solved in the complex field.

6. Discuss the three major concrete models of Boolean algebra: the algebra of sets, the algebra of electrical circuits, and the algebra of logic.

7. Describe other applications of abstract algebra such as in avoiding problems of round off in computations

Department of Mathematics

2018-19 (Odd)

Learning Objective & Outcomes

M.Sc. (Mathematics) 1st Semester

Subject: Measure & Integration   **Subject Code: MTH-102**

Learning Objective

1. Revision of basic tools, including in particular the concept of countable/uncountable sets.

2. Be able to describe at least one approach to the construction of Lebesgue measure, the Lebesgue integral of a function and measure spaces.

3. Know the principal theorems as treated and their proofs and be able to use them in the investigation of examples.

4. Be able to prove simple unseen propositions concerning measure spaces, Lebesgue measure and integration.

5. To gain understanding of the abstract measure theory and definition and main properties of the integral.

6. To construct Lebesgue's measure on the real line and in n-dimensional Euclidean space.

7. To explain the basic advanced directions of the theory.

Learning Outcomes

After the completion of the course, Student will be able to

1. understand σ-algebras, measurable sets, measures, outer measures, Lebesgue measure and its properties, completion of measures.

2. understand measurable functions, approximation by simple functions.

3. understand Lebesgue integral, Monotone Convergence Theorem, Dominated Convergence Theorem, coincidence of Lebesgue and Riemann integral for Riemann integrable functions.

4. develop an appreciation of the basic concepts of measure theory. These methods will be useful for further study in a range of other fields, e.g. Stochastic calculus, Quantum Theory and Harmonic analysis.

5. establish relation to graduate attributes: The above outcomes are related to the development of the Science Faculty Graduate Attributes, in particular: Research, inquiry and analytical thinking abilities, Communication, and Information literacy

GDC Memorial College, Bahal (Bhiwani)
Department of Mathematics
2018-19(Odd)

Learning Objective & Outcomes

M.Sc. (Mathematics) Ist Semester

Subject : Mechanics   **Subject Code : MTH-103**

Learning Objective

1. To demonstrate knowledge and understanding of the following fundamental concepts in the dynamics of system of particles,

2. To demonstrate knowledge and understanding of the following fundamental concepts in motion of rigid body,

3. To demonstrate knowledge and understanding of the following fundamental concepts in Lagrangian and Hamiltonian formulation of mechanics

4. To represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation of classical mechanics.

5. To develop math skills.

Learning Outcomes

After the completion of the course, Students will be able to

1. define and understand basic mechanical concepts related to discrete and continuous mechanical systems,

2. describe and understand the vibrations of discrete and continuous mechanical systems,

3. describe and understand planar and spatial motion of a rigid body,

4. describe and understand the motion of a mechanical system using Lagrange-Hamilton formalism.

GDC Memorial College, Bahal (Bhiwani)

Department of Mathematics

2018-19(Odd)

Learning Objective & Outcomes

M.Sc. (Mathematics) Ist Semester

Subject : Ordinary Differential Equation   Subject Code : MTH-104

Learning Objective

1. To aware the students about initial value and boundary value problems and their corresponding equivalent integral equations.
2. To aware the students about concepts of approximate solution and existence theorem.
3. To familiarize the students about Adjoint system in detail.
4. Detailed study of Fundamental Set and matrix.
5. To demonstrate knowledge and understanding of Critical points in Autonomous system and their stability.

Learning Outcomes

After the completion of the course, Students will be able to

1. Solve problems in ordinary differential equations, dynamical systems, stability theory, and a number of applications to scientific and engineering problems.
2. Demonstrate their ability to write coherent mathematical proofs and scientific arguments needed to communicate the results obtained from differential equation models.
3. Demonstrate their understanding of how physical phenomena are modelled by differential equations and dynamical systems.
4. Implement solution methods using appropriate technology, and
5. Investigate the qualitative behavior of solutions of systems of differential equations

Department of Mathematics

Learning Objective & Outcomes

M.Sc. (Mathematics) Ist Semester

Subject: Topology   **Subject Code: MTH-105**

Learning Objective

1. To make students familiar with basic concepts of topology.

2. This course will introduce students to essential notions in topology, such as topological spaces, continuous functions, and compactness.

3. The main purpose for this course is to introduce Topological spaces, Open Sets, closed sets, and Subspaces, Basis, Product Topology and Subbasis, Metrics.

4. To introduce Metric spaces, Hausdorff Space, Sequences in Topological Spaces, Metrizability Problem and Examples of Metrizable Spaces, Continuity, and Homeomorphisms, Compactness, Limit Point Compactness and Sequentially Compact Spaces and Some of their properties.

Learning Outcomes

After the completion of the course, Students will be able to

1. Evaluate their ability to do problems based on the learning objectives.

2. State and prove standard results regarding topological spaces and continuous functions, and decide whether a simple unseen statement about them is true, providing a proof or counterexample as appropriate.

3. Calculate simple topological invariants, such as the number of path components.

4. State and prove standard results regarding compact and/or connected topological spaces, and decide whether a simple unseen statement about them is true, providing a proof or counterexample as appropriate.

5. Provide an elementary example illustrating specified behaviour in relation to a given combination of basic definitions and key theorems across the course.

GDC Memorial College, Bahal (Bhiwani)

Department of Mathematics

2018-19(Odd)

Learning Objectives & Outcomes

M.Sc. (Mathematics) 1st Semester

Subject: Communication Skills   **Subject Code: MTH-108**

Learning Objectives

1. Students will demonstrate competency in research skills related to the use of the field's professional literature and in systematic research design and implementation.

2. Students will demonstrate an understanding of multiple theoretical perspectives and diverse intellectual traditions in Communication.

3. Students will demonstrate competency in human relational interaction.

4. Students will demonstrate competency in the analysis and practice of ethical communication.

5. Students will demonstrate an understanding of the importance of free expression and the responsibilities it entails.

6. Students will demonstrate competency in effective communication with diverse others and an understanding of the impact of culture on communication

Learning outcomes

After completion of the course Students will be able to

1. Demonstrate critical and innovative thinking

2. Display competence in oral, written, and visual communication.

3. Apply communication theories.

4. Show an understanding of opportunities in the field of communication.

GDC Memorial College, Bahal (Bhiwani)
Department of Mathematics
2018-19 (Even)

Learning Objective & Outcomes
M.Sc. (Mathematics) 2nd Semester
Subject: Abstract Algebra-II   **Subject Code: MTH-201**

Learning Objective

1. Present the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers.
2. Present concepts of and the relationships between operations satisfying various properties (e.g. commutative property).
3. Present concepts and properties of various algebraic structures.
4. Discuss the importance of algebraic properties relative to working within various number systems.
5. Develop the ability to form and evaluate conjectures.

Learning Outcomes

After the completion of the course,

1. Student will be able to understand the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers.
2. Student will be able to verify relationships between operations satisfying various properties (e.g. commutative property).
3. Student will be able to work within various algebraic structures.
4. Students will have a working knowledge of important mathematical concepts in abstract algebra such as definition of a module, properties of module and application of module.
5. Students will be knowledgeable of different types of modules such as noetherian module, artinian module and understand the structure and characteristics of these modules.
6. Students will be introduced to and have knowledge of many mathematical concepts studied in abstract mathematics such as Nil ideal and Nilpotent ideal.

Department of Mathematics
2018-19 (Even)

Learning Objective & Outcomes
M.Sc. (Mathematics) 2nd Semester

Subject: Complex Analysis   **Subject Code: MTH-202**

Learning Objective

1. To provide an introduction to the theories for functions of a complex variable.

2. To explore algebraic, geometric and topological structures of the complex number field.

3. To introduce the concepts of analyticity, Cauchy-Riemann relations and harmonic functions.

4. To present Complex integration and complex power series.

5. To discuss the classification of isolated singularities and examine the theory and illustrate the applications of the calculus of residues in the evaluation of integrals.

Learning Outcomes

After the completion of the course,

1. Student will have introduced to the fundamental concepts of complex analysis and their role in modern mathematics and applied contexts.

2. Student will demonstrate to accurate and efficient use of complex analysis techniques.

3. Student will be able to understand capacity for mathematical reasoning through analyzing, proving and explaining concepts from complex analysis

4. Student will be able to apply problem-solving using complex analysis techniques applied to diverse situations in physics, engineering and other mathematical contexts.

5. Student will be able to apply problem-solving using evaluation of improper integral by Cauchy Residue Theorem.

GDC Memorial College, Bahal (BHiwani)

Department of Mathematics

2018-19(Even)

Learning Objective & Outcomes

M.Sc.(Mathematics) 2nd Semester

Subject: Partial Differential Equation.   **Subject Code: MTH - 203**

Learning Objectives

1. Introduce students to partial differential equations.

2. Introduce students to how to solve linear Partial Differential with different methods.

3. Introduce students to some physical problems in Engineering and Biological models that results in partial differential equations. Partial differential equations allow deterministic mathematical formulations of phenomena in physics and engineering as well as biological processes among many other scenarios.

4. The objective of this course is to present the main results in the context of partial differential equations that allow learning about these models and to study numerical methods for the approximation of their solution.

5. To discuss some methods to solve Laplace Heat and Wave Equations.

Learning Outcomes

After the completion of the course, Students will be able to

1. classify partial differential equations and transform into canonical form.

2. Solve linear partial differential equations of both first and second order.

3. Apply specific methodologies, techniques and resources to conduct research and produce innovative results in the area of specialisation.

4. Extract information from partial derivative models in order to interpret reality. Identify real phenomena as models of partial derivative equations.

5. Solve complex problems of Heat, Wave and Laplace Equations by applying the knowledge acquired to areas that are different to the original ones. Solve real problems by identifying them appropriately from the perspective of partial derivative equations.

GDC Memorial College, Bahal (BHiwani)

Department of Mathematics

2018-19(Even)

Learning Objective & Outcomes

M.Sc.(Mathematics) 2nd Semester

Subject: Numerical Analysis   **Subject Code: MTH-204**

Learning Objective

The objectives of this course are to:

1. Derive appropriate numerical methods to solve algebraic and transcendental equations & approximating the solution of problems.
2. Analyze the error incumbent in any such numerical approximation.
3. Study different techniques of interpolation.
4. Derive appropriate numerical methods to evaluate a derivative at a value.
5. Derive appropriate numerical methods to solve a linear system of equations.
6. Perform an error analysis for various numerical methods.
7. Study various concepts of difference equations.
8. Derive appropriate numerical methods to calculate a definite integral.

Learning Outcomes

After the completion of the course, Students will be able to

1. Solve an algebraic or transcendental equation using an appropriate numerical method.
2. Approximate a function using an appropriate numerical method.
3. Solve a differential equation using an appropriate numerical method.
4. Evaluate a derivative at a value using an appropriate numerical method.
5. Solve a linear system of equations using an appropriate numerical method.
6. Perform an error analysis for a given numerical method.
7. Prove results for numerical root finding methods.
8. Calculate a definite integral using an appropriate numerical method.

GDC Memorial College, Bahal (Bhiwani)
Department of Mathematics
2018-19(Even)

Learning Objective & Outcomes
M.Sc.(Mathematics) 2nd Semester
Subject: Mathematical Statistics   **Subject Code: MTH - 205**

Learning Objective

The objectives of this course are to:

1. Understand the theory of statistics and their applications.
2. Understand the concepts of Probability.
3. To analyse different distributions along with their properties.
4. Aware the students about mathematical expectation, variance, moment generating function and moment about mean & about origin.
5. To understand the concepts of testing hypothesis.

Learning Outcomes

After the completion of the course, Students will be able to

1. Differentiate between discrete and continuous random variables.
2. Solve the problems related to Bay's theorem.
3. Calculate mean, variance, Standard deviation of different types of theoretical distribution.
4. Apply different types of tests of significance.
5. Differentiate between types of error.
6. Understand Null & alternative hypothesis for testing.

Department of Mathematics

2018-19 (Odd)

Learning Objective & Outcomes

M.Sc. (Mathematics) 3rd Semester

Subject: Functional Analysis   **Subject Code: MTH - 301**

Learning Objective

1. To know and be able to use the elementary properties of normed and inner product spaces.

2. To be able to check whether a linear operator is bounded, to find its adjoint and determine whether operators are normal, self adjoint, unitary or positive.

3. To determine whether a bounded operator is invertible and understand the importance of the spectrum of a bounded linear operator.

4. To study normed linear spaces and some of the linear operators between them and give some applications of their use.

5. To introduce the theory of Lebesgue integration with the aim of providing examples of complete normed linear spaces of integrable functions.

Learning Outcomes

After the completion of the course, Students will be able to

1. Improve abilities in mathematical reasoning and in expressing themselves accurately in writing by producing correct mathematical proofs.

2. Use logical reasoning to prove theorems.

3. introduced to the concept of continuity and be familiar with the statements and proofs of the standard results about continuous real functions;

4. Understand the concept of the differentiability of a real valued function and be familiar with the statements and proofs of the standard results about differentiable real functions.

5. Understand the concept of Signed measure, Baire measure and continuous function with compact support.

GDC Memorial College, Bahal (Bhiwani)

Department of Mathematics

2018-19 (Odd)

Learning Objective & Outcomes

M.Sc. (Mathematics) 3rd Semester

Subject: Integral Equation   **Subject Code: MTH - 302**

Learning Objective

1. To know basic concept of Integral Equation & its types

2. To Study concepts of Successive approximations

3. To get knowledge about convergence and uniqueness of the solution

4. To familiarized with the concept of iterations.

5. To get basic knowledge about different Fredhelm's theorems

6. To know concepts of Symmetric kernels.

Learning Outcomes

After the completion of the course, Students will be able to

1. Identify different types of Integral equation.

2. Use different methods to solve integral equations.

3. Have complete information about Orthonormal system of functions

4. Know about expansions in Eigen functions and Bilinear forms

5. Understand the concept Hilbert Schmidt theorem and its consequences.

GDC Memorial College, Bahal (Bhiwani)
Department of Mathematics
2018-19 (Odd)

Learning Objective & Outcomes
M.Sc. (Mathematics) 3rd Semester

Subject: Operation Research techniques　　　　　　　　**Subject Code: MTH - 303**

Learning Objective

The objectives of this course are to :

1. Introduce students to the techniques of Operation research.
2. Provide students with basic skills and knowledge of Operations research and its application.
3. Introduce students to practical application of Operation research.
4. Understand the mathematical tools that are needed to solve optimisation problems.
5. Give knowledge about basic concepts of Linear programming.

Learning Outcomes

 After the completion of the course, Students will be able to

1. Explain the meaning of Operation research.
2. Know and use various techniques of Operation research.
3. Apply the techniques used in operations research to solve real life problems.
4. Have complete understanding of the significant role of operation research.
5. Solve transportation problems.
6. To solve problems by linear programming etc.
7. Apply Duality to solve problems in Linear Programming.
8. Understand Test the optimality for Degeneracy by using Transportation Algorithms (MODI method).

Learning Objective & Outcomes
M.Sc.(Mathematics) 3rd Semester

Subject: Mech. Of Solids   **Subject Code:** MTH - 304

Learning Objectives

1. The main objective of the course will be to show how to determine the stress, strain, and deflection suffered by bi-dimensional (and simple tridimensional) structural elements when subjected to different loads (e.g. normal, shear, torsion, bending and combined loads).

2. Once the state of stresses and strains has been established for a particular structure type, the student will be able to evaluate the allowable loads and associated allowable stresses before mechanical failure.

3. Understanding the adequacy of mechanical and structural elements under different loads is essential for the design and safe evaluation of any kind of structure.

4. This course is a major subject in many different engineering careers (Aeronautics, civil engineering, antennas, etc.).

Learning Outcomes

1. Understand the fundamental concepts of stress and strain and the relationship between both through the strain-stress equations in order to solve problems for simple tridimensional elastic solids.

2. Calculate and represent the stress diagrams in bars and simple structures.

3. Solve problems relating to pure and non-uniform bending of beams and other simple structures .

4. Solve problems relating to torsional deformation of bars and other simple tri-dimensional structures.

5. Understand the concept of buckling and be able to solve the problems related to isolated bars.

6. Distinguish between isostatic and hiperstatic problems and be able to use various methods for the resolution of both.

7. Be familiar with at least one software program for the evaluation of structures

GDC Memorial College, Bahal (BHiwani)
Department of Mathematics
2018-19(Odd)

Learning Objective & Outcomes
M.Sc.(Mathematics) 3rd Semester

Subject : Fluid Dynamics   **Subject Code : MTH 305**

Learning Objectives

1. The student will learn analytical solution techniques for diverse fluid problems, including lubrication flows, boundary layers, and Stokes flow, in steady and unsteady conditions.

2. learn analytical techniques required to solve fluid flow equations for different geometries and flow conditions.

3. learn the fundamentals physics involved in modelling fluids and hydrodynamic phenomena .

4. Through learned analytical methods and basic numerical techniques presented in this course the students will be able to determine volumetric flow rates, shear and pressure drag, and lift forces for different geometric configurations.

5. The course provides fundamental tools for professional engineers working in fluid mechanics.

Learning Outcomes

1. Identify the relevant parameters that govern a fluid system and use dimensional analysis to identify the fundamental variables that define flow [SO1].

2. Analyze microscopic continuum fluid mechanics where flow is governed by the continuity equation and Navier-Stokes equation (differential forms of conservation equations). Evaluate a problem and arrive at reasonable approximations to put the equations in a more soluble form [SO1].

3. Analyze systems using macroscopic fluid mechanics, using the integral form of the conservation equations (Bernoulli's equation) [SO1,SO3].

4. Explain the fundamental properties of fluids, including viscosity, Newtonian and non Newtonian rheology, and viscoelasticity [SO1].

5. Evaluate pressure distributions in a static fluid, taking account of hydrostatic pressure, buoyancy force, and interfacial tension (Laplace pressure and capillary action) [SO1].

GDC Memorial College, Bahal (BHiwani)
Department of Mathematics
2018-19(Even)

Learning Objective & Outcomes
M.Sc.(Mathematics) 4th Semester

Subject : Differential Geometry   **Subject Code : MTH 401**

Learning Objectives

1. In this course the student will learn about tangent spaces, Surfaces, Gauss map, Geodesics on surfaces and curvature of plane curves.
2. To know basic knowledge about Edge of regression
3. Understand the Principal directions and Curvatures.

Learning Outcomes

After the completion of the course, Students will be able to

1. Understand the concept of Graphs and Level sets-Vector fields.
2. Analyze Surfaces and Vector field on surfaces
3. Understand Gauss map-Geodesics.
4. Apply Parallel Transport and Weingarten map.
5. Study the concept of Curvature of plane curves and surface.

GDC Memorial College, Bahal (BHiwani)
Department of Mathematics
2018-19(Even)

Learning Objective & Outcomes
M.Sc.(Mathematics) 4th Semester
Subject : Discrete Mathematics   **Subject Code : MTH 402**
Learning Objective

The objectives of this course are to:

1. Introduce the concepts of Graph and their different types as well as the isomorphism between them.
2. Introduce the classes of Eulerian and Hamiltonian graphs, trees and weighted graphs.
3. Know about Directed graph, Tree and Illustrate how to find minimal walks in graphs.
4. Introduce vertex and edge colourings of graphs and to find out the different methods of searching tree.
5. Get basic understanding about Formal logic and Lattices.
6. Prepare students to develop mathematical foundations to understand and create mathematical arguments, require in learning many mathematics and computer sciences courses. To motivate students how to solve practical problems using discrete mathematics

Learning Outcomes

After the completion of the course, Students will be able to

1. Understand the theoretical base of the subject and Identify different types of the graphs and be able to apply different operations on them.
2. Identify Eulerian and Hamiltonian graphs.
3. Apply special algorithms to find minimal walks in weighted graphs.
4. Apply special algorithms to find spanning trees in graphs.
5. Find chromatic numbers and be able to find out planer graphs.
6. understand how lattices and Boolean algebra are used as tools and mathematical models in the study of networks.
7. learn how to work with some of the discrete structures which include sets, relations, functions, graphs and recurrence relation.

GDC Memorial College, Bahal (BHiwani)

Department of Mathematics

2018-19(Even)

Learning Objective & Outcomes

M.Sc.(Mathematics) 4th Semester

Subject : Analytical Number theory   **Subject Code : MTH 403**

Learning Objective

1. The purpose of the course is to give a simple account of classical number theory.

2. To demonstrate applications of number theory .

3. Upon completion of the course, students will have a working knowledge of the fundamental definitions and theorems of elementary number theory, be able to work with congruences, solve congruence equations and systems of equations with one and more variables, and be literate in the language and notation of number theory.

Learning Outcomes

After the completion of the course, Students will be able to

1. Understand the properties of divisibility and prime numbers, compute the greatest common divisor and least common multiples.

2. Understand the operations with congruences, linear and non-linear congruence equations

3. Understand and use Chinese Remainder Theorem

4. Use arithmetic functions in areas of mathematics.

5. Understand continue fractions and will be able to approximate reals by rationals,

6. Understand the basics of Mobius Inversion formula.

GDC Memorial College, Bahal (Bhiwani)
Department of Mathematics
2018-19(Even)

Learning Objective & Outcomes
M.Sc.(Mathematics) 4th Semester

Subject : Mechanics of Solid-II   **Subject Code : MTH 404**
Learning Objective

1. To draw Free Body Diagrams (FBD) for rigid bodies, beams, 2-D and 3-D structures, frames and machines, and set up equilibrium equations (i.e. forces and couples) for them.
2. To solve problems and identify the fundamental elements involved in the mechanical design of engineering structures; e.g. which failure / safety criterion to apply for different applications, failure prediction and analysis.
3. To understand the concepts of stress at a point, strain at a point, and the stress-strain relationships for linear, elastic, homogeneous, isotropic materials.
4. To determine principal stresses and angles, maximum shearing stresses and angles, and the stresses acting on any arbitrary plane within a structural element.
5. Understanding the adequacy of mechanical and structural elements under different loads is essential for the design and safe evaluation of any kind of structure.
6. This course is a major subject in many different engineering careers (Aeronautics, civil engineering, antennas, etc.).

Learning Outcomes
After the completion of the course, Students will be able to

1. To utilize basic properties of materials such as elastic moduli and Poisson's ratio to appropriately to solve problems related to isotropic elasticity.
2. Calculate and represent the stress diagrams in bars and simple structures.
3. Solve problems relating to pure and non-uniform bending of beams and other simple structures.
4. Solve problems relating to torsional deformation of bars and other simple tri-dimensional structures.
5. Understand the concept of buckling and be able to solve the problems related to isolated bars.
6. Distinguish between isostatic and hiperstatic problems and be able to use various methods for the resolution of both.
7. Be familiar with at least one software program for the evaluation of structures

Department of Mathematics

2018-19(Even)

Learning Objective & Outcomes

M.Sc.(Mathematics) 4th Semester

Subject : Advance Fluid Dynamics   **Subject Code : MTH 405**

Learning Objective

1. The student will learn analytical solution techniques for diverse fluid problems, including lubrication flows, boundary layers, and Stokes flow, in steady and unsteady conditions.
2. learn analytical techniques required to solve fluid flow equations for different geometries and flow conditions.
3. learn the fundamentals physics involved in modelling fluids and hydrodynamic phenomena .
4. Through learned analytical methods and basic numerical techniques presented in this course the students will be able to determine volumetric flow rates, shear and pressure drag, and lift forces for different geometric configurations.
5. The course provides fundamental tools for professional engineers working in fluid mechanics.

Learning Outcomes

After the completion of the course, Students will be able to

1. Identify the relevant parameters that govern a fluid system and use dimensional analysis to identify the fundamental variables that define flow [SO1].

2. Analyze microscopic continuum fluid mechanics where flow is governed by the continuity equation and Navier-Stokes equation (differential forms of conservation equations). Evaluate a problem and arrive at reasonable approximations to put the equations in a more soluble form [SO1].

3. Analyze systems using macroscopic fluid mechanics, using the integral form of the conservation equations (Bernoulli's equation) [SO1,SO3].

4. Explain the fundamental properties of fluids, including viscosity, Newtonian and non Newtonian rheology, and viscoelasticity [SO1].

5. Evaluate pressure distributions in a static fluid, taking account of hydrostatic pressure, buoyancy force, and interfacial tension (Laplace pressure and capillary action) [SO1].