

Faculty of Sciences
Syllabus for
Bachelor of Science (Honours) Mathematics
(Under Continuous Evaluation System)
(SEMESTER-I-IV)
Session- 2020-21



Kanya Maha Vidyalaya, Jalandhar
(Autonomous)
The Heritage Institution

Bachelor of Science (Honours) Mathematics
Session: 2020 -21
Programme Specific Outcomes

Upon successful completion of this course, students will be able to:

PSO1: Solve complex Mathematical problems by critical understanding, analysis and synthesis. Students will also be able to provide a systematic understanding of the concepts and theorem of Mathematics and their applications in the real world to an advanced level, enhance career prospects in a huge array of field suitable to succeed at an entry level position in Mathematics post graduate program.

PSO2: Demonstrate proficiency in Mathematics and the Mathematical concepts needed for a proper understanding of Physics, Chemistry, Electronics, Computer Science and Economics.

PSO3: Create and develop Mathematical software application using a systematic approach & apply discrete Mathematical concept to practical application.

PSO4: Demonstrate knowledge of Calculus I & II, Matrices and Theory of Equations, Analytical and Solid Geometry, Statics & Tensor Calculus and able to apply this knowledge to analyze a variety of Mathematical Phenomena.

PSO5: Demonstrate knowledge of physical chemistry & apply this knowledge to analyze a variety of chemical phenomena & will be able to interpret and analyze quantitative data.

PSO6: Understand and demonstrate the knowledge of Mechanics, area, volume and displacement with differential equation of the orbit.

PSO7: Understand the basic concepts and basic principles of Demand and Supply, Measurement of Price Elasticity of Demand and apply Economic theories to derive cost function from Production Function.

PSO8: Learn implications of Revenue curves and their mutual relationships.

PSO9: Develop statistical approach and mathematical thinking among students to problem solving on a diverse variety of disciplines.

PSO10: Have knowledge of computer fundamentals, able to handle practical programming problems using C and analyze large volume of data using various statistical techniques

Bachelor of Science (Honours) Mathematics
Semester-I
Session- 2020-21
Course Title: Calculus-I
Course Code: BOML-1333

Course Outcomes

After passing this course, the students will be able to:

CO 1: Understand real number system, lub & glb of set of real numbers, limit of a function, basic properties of limit & to apply it in real world problem.

CO 2: Analyses continuous and discontinuous function, Apply concept of continuity in uniform continuity.

CO 3: Demonstrate Asymptotes, points of inflexion, multiple points on a curve & also to differentiate between concavity and convexity & hence tracing of curve.

CO 4: Apply reduction formula on different functions & to apply in a wide variety of disciplines like Bio, Eco, Physics & Engineering.

CO 5 : To understand the concepts of Riemann sum, partitions, upper and lower sums, Riemann integrability of continuous functions and of monotone functions.

CO 6: To Classify the difference between increasing and decreasing functions.

Bachelor of Science (Honours) Mathematics
Semester–I
Session- 2020-21
Course Title: Coordinate Geometry
Course Code: BOML-1334

Course Outcomes

After passing this course, the students will be able to:

CO 1: Understand the concept of the geometry of lines and conics in the Euclidian plane.

CO 2: Develop geometry with a degree of confidence and will gain fluency in the basics of Euclidian geometry.

CO 3: Sketch conic sections; identify conic sections, their focal properties and classifications.

CO 4: Demonstrate the concept of parabola, ellipse, hyperbola, sphere and the general quadratic equation.

CO 5: Understand the concept of coordinate geometry on a wider scale with the help of shifting of origin and rotation of axis.

Bachelor of Science (Honours) Mathematics
Semester-I
Session-2020 -21
Course Title: Statics
Course Code: BOML-1336

Course Outcomes

After passing this course, the students will be able to:

CO 1: Apply parallelogram law of forces, triangle law of forces, Lami's theorem to real life problems.

CO 2: Understand that how one can resolve number of coplanar forces, parallel forces and concurrent forces acting at a body.

CO 3: Find the moments of number of coplanar forces acting at a particle

CO 4: Find the resultant of a force and couple acting on a body.

CO 5: Find the applications of CG of a rod, triangular lamina, solid hemisphere, hollow hemisphere, solid cone and hollow cone.

Bachelor of Science (Honours) Mathematics Semester–II
Session 2020-21
Course Title: Calculus-II
Course Code: BOML-2333

Course Outcomes

After passing this course, the students will be able to:

CO 1: Demonstrate an understanding of limits and how they are used in sequences and series.

CO 2: Know and describe the converging behaviour of Power series and Taylor series.

CO 3: Distinguish between the absolute convergence and conditional convergence.

CO 4: Manage to solve the problem related to Fourier series expansion, Fourier series for even and odd functions and half range series.

Bachelor of Science (Honours) Mathematics Semester–II
Session 2020-21
Course Title: Matrices and Theory of Equations
Course Code: BOML-2334

Course Outcomes

After passing this course, the students will be able to:

CO 1: Distinguish between solution of cubic equations and Bi-quadratic equations.

CO 2: Explain how all polynomials can be broken down by using Fundamental Theorem of Algebra to provide structure for abstraction into fields like Modern Algebra.

CO 3: Understand the concept of matrix congruence of skew symmetric matrices and its reduction in real field.

CO 4: Solve system of linear equations and obtain Eigen values, Eigen vectors, minimal and characteristic equation of a matrix and to apply it in advanced dynamics and electric current.

CO 5: To find the relations between the roots and coefficients of general polynomial equation in one variable.

Bachelor of Science (Honours) Mathematics Semester–II
Session 2020-21
Course Title: Solid Geometry
Course Code: BOML-2335

Course Outcomes

After passing this course, the students will be able to:

CO 1: Demonstrate the concept of cone, classification of cone, intersection of line and cone, reciprocal cone.

CO 2: Understand the concept of cylinder, enveloping cylinder and its limiting form.

CO 3: Describe the concept of conicoids or quadratic surface, its classification, trace different types of conicoids.

CO 4: Manage to find surface of revolution and concept of tangent and normal to the conicoid

CO 5: Identify the conicoids and representing it in the form of hyperboloid, ellipsoid, paraboloid.

Bachelor of Science (Honours) Mathematics Semester–II
Session 2020-21
Course Title: Dynamics
Course Code: BOML-2336

Course Outcomes

After passing this course, the students will be able to:

- CO 1: Identify the basic relations between distance, time, velocity and acceleration.
- CO 2: Explain the relationship between forces and motion. Differentiate between balanced and unbalanced forces and Explain how unbalanced force affect motion.
- CO 3: Understand Newton's Laws of Motion and Apply the laws to solve many problems.
- CO 4: Discuss the motion of particles connected by a string, motion along a smooth inclined plane.
- CO 5: Solve different types of problems with Variable Acceleration.
- CO 6: Discuss Simple Harmonic Motion and Illustrate it with a variety of examples.
- CO 7: Solve Pendulum, Damped and forced Oscillations oscillating system problems.
- CO 8: Define Work, Power and Energy and Explain their relationship. Use measurement tools to apply the concepts of Work and power to solve real life problems.
- CO 9: Define Energy and Identify the different types that exist

Bachelor of Science (Honours) Mathematics
Semester–III

Session- 2020-21

Course Title: Calculus III

Course Code: BOML-3331

Course Outcomes

After passing this course, the students will be able to:

CO1: Evaluate Partial derivatives and recognize the various notations used r partial derivatives.

CO2: To find optimization value for a function of several variables.

CO3: Apply double integration technique in finding the area of a region.

CO4: Recognize the appropriate tools of calculus to solve applied problems.

CO5: Analyze functions using limit, continuity, derivative and integration

Bachelor of Science (Honours) Mathematics
Semester–III

Session- 2020 -21

Course Title: Ordinary Differential Equations & Special Functions

Course Code: BOML-3332

Course Outcomes

After passing this course, the students will be able to:

CO1: Demonstrate the concept Of Linear Differential equation with constant and variable coefficients

CO2: Apply in wide variety of disciplines Physics, Biology, Economics

CO3: Manage to solve the problems related to series solution of Differential equation by power series method.

CO4: Understand the Bessel function and their application to physical world

CO5: Understand the Legendre function and their application to physical world

Bachelor of Science (Honours) Mathematics

Semester–III

Session- 2020-21

Course Title: Probability Theory

Course Code: BOML-3333

Course Outcomes

After passing this course, the students will be able to:

- CO1: Find the probability of single event and compound and complimentary event
- CO2: Contrast discrete and continuous random variable
- CO3: Apply general Properties of expectation and variance
- CO4: Differentiate between the events with Binomial and Poisson distribution
- CO5: Apply Normal distribution in real time applications
- CO6: Translate the real world problem into probability based mathematical model
- CO7: Identify the characteristics of different continuous and discrete distribution
- CO8: Use different distributions to solve practical problems

Bachelor of Science (Honours) Mathematics
Semester–III

Session- 2020-21

Course Title: Linear Algebra

Course Code: BOML-3334

Course Outcomes

After passing this course, the students will be able to:

CO1: To understand the concepts of base and dimension of vector space.

CO2: To get familiar with row and column space of a matrix.

CO3: To understand matrix representation of a linear transformation

CO4: To find kernel and image spaces of a linear transformation.

Bachelor of Science (Honours) Mathematics Semester-IV

Session: 2020-21

Course Title : Vector Calculus

Course Code: BOML-4331

Course Outcomes

After passing this course, the students will be able to:

CO 1: Apply the concepts of line integral, double integral and triple integral in solving engineering problems.

CO 2: Understand the physical concept of vectors.

CO 3: Perform basic calculus on vector-valued functions.

CO 4: Solve physical problems based on calculus using vector-valued functions.

CO 5: Calculate the unit tangent vector, the unit normal vector and the unit binomial vector at a point on a space curve described by a vector-valued position function.

CO 6: Find the values of gradient, divergence and curl operator of given vectors.

CO 7: Find the application of Gauss theorem, Green's theorem and Stokes's theorem in real life problems.

Bachelor of Science (Honours) Mathematics Semester-IV
Session: 2020-21
Course Title: Partial Differential Equations
Course Code: BOML- 4332
Course Outcomes

After passing this course, the students will be able to:

- CO 1: Apply a range of techniques to find solutions of partial differential equations.
- CO 2: Understand basic properties of standard partial differential equations.
- CO 3: Perform various methods to solve homogeneous and non-homogeneous partial differential equations and apply these methods in solving some physical problems.
- CO 4: Formulate, classify and transform partial differential equations into canonical form.
- CO 5: Determine the existence, uniqueness, and well-posedness of solution of PDEs
- CO 6: Use computational tools to solve problems and applications of Partial Differential Equations.
- CO 7: Apply in wide variety of disciplines Physics, Biology and Economics

Bachelor of Science (Honours) Mathematics Semester-IV

Session: 2020-21

Course Title :Group Theory

Course Code: BOML - 4333

Course Outcomes

Upon completion of this course, students should be able to:

CO 1: Demonstrate understanding and the ability to work within various algebraic structures.

CO 2: Demonstrate understanding of the importance of algebraic properties with regard to working with various number systems.

CO 3: Effectively write abstract mathematical proofs in a clear and logical manner.

CO 4: Explain the fundamental concepts of groups and subgroups.

CO 5: Use Lagrange's theorem to analyze the cyclic subgroups of a group.

CO 6: Explain the significance of the notion of a normal subgroup, quotient group, cyclic group and simple group.

CO 7: Use the concepts of homomorphism, isomorphism and automorphism.

CO 8: State isomorphism theorems and use them to work with permutation, cyclic and normal groups.

CO 9: Describe the structure of finite abelian group.

CO 10: Use Cauchy's theorems to describe the structures of certain abelian groups.

Bachelor of Science (Honours) Mathematics Semester-IV
Session: 2020-21
Course Title: Statistical Methods
Course Code: BOMM-4334
Course Outcomes

Upon completion of this course, students should be able to:

- CO 1: Understand the concept of correlation among the data and its physical significances.
- CO 2: State and apply the techniques to identify correlation between given set of data.
- CO 3: Fit regression curves depicting relation among the physical quantities.
- CO 4: Understand the logic and framework of the inference of hypothesis testing.
- CO 5: Understand hypothesis testing as making an argument
- CO 6: Interpret the results of the hypothesis test.

