

**Lesson Plan for Course: B.Sc. (H) Class-1<sup>st</sup> Year Code: MTMA Paper-I Marks: 100**

- Course Name: Algebra, LPP and Geometry
- Course coordinator: Biswajit Sarkar
- Course Outcomes:
  - CO-1. To find out nth roots of unity.
  - CO-2. Able to apply De Moivre's theorem.
  - CO-3. To understand the Descartes rule of signs and its application.
  - CO-4. To apply  $AM \geq GM \geq HM$  in inequality.
  - CO-5. Capable to find rank of a matrix and to find the solutions of systems of linear equations.
  - CO-6. To solve LPP (Primal & Dual) through various methods.
  - CO-7. To solve transportation problem, assignment problems etc.
  - CO-8. To learn about the applications to two-person zero-sum game problems.
  - CO-9. To classify quadrics.

**Course planner**

Month	Course Topic	Teacher	No. of Classes	Remarks*
July	Modern Algebra I	PD	05	Theoretical-14 Tutorial-00
	Linear Algebra I	SM	05	
	Classical Algebra I	BS	04	
August	Modern Algebra I	PD	14	Theoretical-35 Tutorial-00
	Linear Algebra I	SM	10	
	Classical Algebra I	BS	11	
Sept	Modern Algebra I	PD	07	Theoretical-26 Tutorial-00
	Analytical Geometry of Two & Three Dimensions I	SM	10	
	Classical Algebra I	BS	09	
Oct	Analytical Geometry of Two & Three Dimensions I	SM	02	Theoretical-07 Tutorial-00
	Introduction to Linear Programming	BS	05	
Nov	Analytical Geometry of Two & Three Dimensions I	SM	10	Theoretical-20 Tutorial-00
	Introduction to Linear Programming	BS	10	
Dec	Analytical Geometry of Two & Three Dimensions I	SM	06	Theoretical-06 Tutorial-00
Jan				Theoretical-00 Tutorial-00
Feb				Theoretical-00 Tutorial-00
Mar				Theoretical-00 Tutorial-00
Apr May Jun	Final Examination			
	<b>Assessment:</b> Test Examination		<b>Total: 108</b>	<b>Theoretical-108 Tutorial-00</b>

**Books:**

- S.K. Mapa, Modern Algebra, Sarat Book
- Chakraborty & Ghosh, Algebra (Abstract and Linear), U.N. Dhur
- Sen, Ghosh, Mukhopadhyay, Topics in Algebra, University Press
- Cohn, Basic Algebra, Springer
- Durbin, Modern Algebra- An Introduction, Wiley India
- S.K. Mapa, Higher Algebra- Classical, Sarat Book
- Dipak Chatterjee, Linear Programming and Game Theory, Phi Learning Pvt. Ltd.
- J. G. Chakravorty And P. R. Ghosh , Advanced Analytical Geometry, U. N. Dhur & Sons Pvt. Ltd.

**Lesson Plan for Course: B.Sc. (H) Class-1<sup>st</sup> Year Code: MTMA Paper-II Marks: 100**

- Course Name: Real Analysis-I, Application of Calculus, Differential Equation-I, Vector Algebra
- Course coordinator: Biswajit Sarkar
- Course Outcomes:
  - CO-1. Understand some elementary concepts in set theory.
  - CO-2. Understand of countability and uncountability concepts.
  - CO-3. Apply Archimedean Property and its application to find limit points of a set.
  - CO-4. Recognize bounded, convergent, divergent, Cauchy and monotonic.
  - CO-5. Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.
  - CO-6. Use Picard's Theorem to test existence of unique solution of 1st order ODE.
  - CO-7. To apply the method of undetermined coefficients and method of variation of parameters.
  - CO-8. Calculate power series solution of a differential equation.
  - CO-9. Able to test continuity, differentiability and integrability of vector functions.

**Course planner**

Month	Course Topic	Teacher	No. of Classes	Remarks*
July				Theoretical-00 Tutorial-00
August				Theoretical-00 Tutorial-00
Sept	Real Analysis I	PD	07	Theoretical-07 Tutorial-00
Oct	Real Analysis I	PD	04	Theoretical-04 Tutorial-00
Nov	Real Analysis I	PD	11	Theoretical-11 Tutorial-00
Dec	Real Analysis I	PD	07	Theoretical-14 Tutorial-00
	Differential Equation I	BS	07	
Jan	Application of Differential Calculus and Evaluation of Integral I	PD	07	Theoretical-17 Tutorial-00
	Vector Algebra & Analysis I	SM	04	
	Differential Equation I	BS	06	
Feb	Application of Differential Calculus and Evaluation of Integral I	PD	11	Theoretical-35 Tutorial-00
	Vector Algebra & Analysis I	SM	12	
	Differential Equation I	BS	12	
Mar	Application of Differential Calculus and Evaluation of Integral I	PD	08	Theoretical-22 Tutorial-00
	Vector Algebra & Analysis I	SM	06	
	Differential Equation I	BS	08	
Apr	<b>Final Examination</b>			
May				
Jun				
	<b>Assessment:</b> Test Examination		<b>Total: 110</b>	<b>Theoretical-110 Tutorial-00</b>

**Books:**

- Sitanshu Bandyopadhyay, Mathematical Analysis- Problems and Solutions, Academic publishers
- A.K. Choudhury & P. Mondal, Mathematical Analysis- Real, Complex and Metric Spaces, New Central Book Agency
- V. Karunakaran, Real Analysis, Pearson
- Utpal Chatterjee, Advanced Mathematical Analysis, Academic Publishers
- Shanti Narayan and Raisinghania, Elements of Real Analysis, S.Chand
- Maity Ghosh, An introduction to Analysis: Differential Calculus (P-I&II), New Central Book Agency
- Santi Narayan and P.K.Mittal, Vector Analysis, S.Chand
- Vector Analysis and Tensor Calculus (Schaum Series) – Spiegel.

**Lesson Plan for Course: B.Sc. (H) Class-2<sup>nd</sup> Year Code: MTMA Paper-III Marks: 100**

- Course Name: Algebra, Real Analysis-II, Function of Several Variables, Appl. of Integral Calculus II
- Course coordinator: Pintu Debnath
- Course Outcomes:
  - CO-1. Understand limits of functions.
  - CO-2. Prove intermediate value theorem and fixed point theorem.
  - CO-3. Find sequential criterions of continuity and uniform continuity.
  - CO-4. Prove Rolle's theorem and apply this theorem to find Taylor's series expression.
  - CO-5. Understand limit and continuity of functions of two or more variables and Partial diff.
  - CO-6. Verify the total differentiability of a function and existence of directional derivatives.
  - CO-7. Apply method of Lagrange multipliers to solve some kind of optimization problems.
  - CO-8. Calculate double and triple integration over rectangular region and non-rectangular region.

**Course planner**

Month	Course Topic	Teacher	No. of Classes	Remarks*
July	Modern Algebra II	PD	03	Theoretical-16 Tutorial-00
	Real Analysis II		02	
	Linear Algebra II	SM	06	
	Classical Algebra II	BS	05	
August	Real Analysis II	PD	14	Theoretical-39 Tutorial-00
	Linear Algebra II	SM	14	
	Function of Several Variables	BS	11	
Sept	Real Analysis II	PD	14	Theoretical-33 Tutorial-00
	Linear Algebra II	SM	05	
	Application of Integral Calculus II		07	
	Function of Several Variables	BS	07	
Oct	Real Analysis II	PD	04	Theoretical-4 Tutorial-00
Nov	Real Analysis II	PD	13	Theoretical-11 Tutorial-02
Dec				Theoretical-00 Tutorial-00
Jan				Theoretical-00 Tutorial-00
Feb				Theoretical-00 Tutorial-00
Mar				Theoretical-00 Tutorial-00
Apr May Jun	Final Examination			
	<b>Assessment:</b> Test Examination		<b>Total: 105</b>	<b>Theoretical-103 Tutorial-02</b>

**Books:**

- Sitanshu Bandyopadhyay, Mathematical Analysis- Problems and Solutions, Academic publishers.
- A.K. Choudhury & P. Mondal, Mathematical Analysis- Real, Complex and Metric Spaces, New Central Book Agency.
- V. Karunakaran, Real Analysis, Pearson.
- Utpal Chatterjee, Advanced Mathematical Analysis, Academic Publishers.
- Subir Mukherjee, First course in Real Analysis, Academic Publishers.
- Shanti Narayan and Raisinghania, Elements of Real Analysis, S.Chand.
- Chakraborty & Ghosh, Algebra (Abstract and Linear), U. N. Dhur & Sons Pvt. Ltd..
- Sk Anarul Islam, Differential Calculus of Several Variables, Techno World.
- Ghosh & Maity, An introduction to integral Calculus, New Central Book Agency.

**Lesson Plan for Course: B.Sc. (H) Class-2<sup>nd</sup> Year Code: MTMA Paper-IV Marks: 100**

- Course Name: Geometry, Differential Equation-II, LPP & Game Theory, Particle Dynamics
- Course coordinator: Pintu Debnath
- Course Outcomes:
  - CO-1. Find equations of pair of tangents, chord of contact, poles and polars, conjugate points and conjugate lines of Circle, Parabola, Ellipse and Hyperbola.
  - CO-2. To learn about hyperboloid, hyperbolic paraboloids, canonical forms and quadrics.
  - CO-3. Solve simultaneous linear differential equations.
  - CO-4. Find Condition of integrability.
  - CO-5. Introduce them with PDE and to solve PDE by Lagrange's method and by Charpit's method.
  - CO-6. Understand Duality Theory and Relation between the objective values of dual and primal.
  - CO-7. Learn Transportation and Assignment problems.
  - CO-8. Learn several methods for solving Rectangular games.
  - CO-9. Know Laws of motion and Principles of conservation of energy.
  - CO-10. Understand loss of K.E. in a direct impact and Oblique impact of two elastic spheres.
  - CO-11. Find motion of a particle under inverse square law, in plane and in resisting medium.
  - CO-12. Understand Motion of a rough curve.

**Course planner**

Month	Course Topic	Teacher	No. of Classes	Remarks*
July				Theoretical-00 Tutorial-00
August				Theoretical-00 Tutorial-00
Sept	Differential Equation II	BS	03	Theoretical-03 Tutorial-00
Oct	Analytical Dynamics of a Particle	SM	04	Theoretical-07 Tutorial-00
	Differential Equation II	BS	03	
Nov	Analytical Dynamics of a Particle	SM	13	Theoretical-24 Tutorial-00
	Linear Programming and Game Theory	BS	11	
Dec	Analytical Geometry of Two & Three dimensions II	PD	07	Theoretical-22 Tutorial-00
	Analytical Dynamics of a Particle	SM	09	
	Linear Programming and Game Theory	BS	06	
Jan	Analytical Geometry of Two & Three dimensions II	PD	07	Theoretical-19 Tutorial-00
	Analytical Dynamics of a Particle	SM	07	
	Linear Programming and Game Theory	BS	05	
Feb	Analytical Geometry of Two & Three dimensions II	PD	12	Theoretical-38 Tutorial-01
	Analytical Dynamics of a Particle	SM	16	
	Linear Programming and Game Theory	BS	11	
Mar	Analytical Geometry of Two & Three dimensions II	PD	10	Theoretical-25 Tutorial-02
	Analytical Dynamics of a Particle	SM	09	
	Linear Programming and Game Theory	BS	08	
Apr May Jun	Final Examination			
	<b>Assessment:</b> Test Examination		<b>Total: 141</b>	<b>Theoretical-138 Tutorial-03</b>

**Books:**

- J. G. Chakravorty And P. R. Ghosh , Advanced Analytical Geometry, U. N. Dhur & Sons Pvt. Ltd.
- S. L. Loney, Dynamics of a Particle and Rigid bodies.
- J. G. Chakravorty And P. R. Ghosh, Advanced Analytical Dynamics, U. N. Dhur & Sons Pvt. Ltd.

Academic Year: 2017-2018 Dept. of Mathematics, Basirhat College Session: Jul, 17-Jun, 18

- Ganguly & Saha, Analytical Dynamics, New Central Book Agency
- Ghosh & Maity, An Introduction to Differential Equations, New Central Book Agency.
- P. M. Karak, Linear Programming, New Central Book Agency.
- Dutta & Jana, Linear Programming, U. N. Dhur & Sons Pvt. Ltd.

**Lesson Plan for Course: B.Sc. (H) Class-3<sup>rd</sup> Year Code: MTMA Paper-V Marks: 100**

- Course Name: Real Analysis II, Metric Space, Complex Analysis.
- Course coordinator: Biswajit Sarkar
- Course Outcomes:
  - CO-1. Understand fundamental idea of metric spaces including Cantor's theorem.
  - CO-2. Learn about Continuity, Uniform continuity, Compactness, Homeomorphism of metric space.
  - CO-3. Realize Banach Fixed point Theorem and its application to ordinary differential equation.
  - CO-4. Learn Cauchy-Riemann equation and differentiability of complex valued function.
  - CO-5. To become familiar with different types of complex valued functions and differences between complex and real valued functions.
  - CO-6. Evaluate Contour integrals and learn about Cauchy integral formula.
  - CO-7. Evaluate Laurent series expansion of complex valued function.

**Course planner**

Month	Course Topic	Teacher	No. of Classes	Remarks*
July	Real Analysis II	PD	05	Theoretical-05 Tutorial-00
August	Real Analysis II	PD	15	Theoretical-14 Tutorial-01
Sept	Real Analysis II	PD	10	Theoretical-10 Tutorial-00
Oct				Theoretical-00 Tutorial-00
Nov	Complex Analysis	SM	07	Theoretical-05 Tutorial-02
Dec	Complex Analysis	SM	02	Theoretical-05 Tutorial-02
	Metric Space	BS	05	
Jan				Theoretical-00 Tutorial-00
Feb				Theoretical-00 Tutorial-00
Mar Apr May Jun	<b>Final Examination</b>			
	<b>Assessment:</b> Test Examination		<b>Total: 44</b>	<b>Theoretical-39 Tutorial-05</b>

**Books:**

- A.K. Choudhury & P. Mondal, Mathematical Analysis- Real, Complex and Metric Spaces, New Central Book Agency.
- V. Karunakaran, Real Analysis, Pearson.
- Arumugam, Complex Analysis, Scitech Publications (India) Pvt Ltd.
- P. K. Jain, Metric Spaces, Narosa.

**Lesson Plan for Course: B.Sc. (H) Class-3<sup>rd</sup> Year Code: MTMA Paper-VI Marks: 100**

- Course Name: Probability & Statistics, Numerical Analysis & Computer Programming
- Course coordinator: Pintu Debnath
- Course Outcomes:
  - CO-1. Understand the basic concepts of classical probability.
  - CO-2. Learn probability distribution and density function and their properties with example.
  - CO-3. Understand central limit theorem which shows that the empirical frequencies of so many natural populations exhibit normal distribution.
  - CO-4. Learn algorithms of a programme.
  - CO-5. Find out Relative error and Round off error.
  - CO-6. To find root of a algebraic an transcendental equation through several techniques.
  - CO-7. To solve system of linear equations using Gaussian Elimination, Gauss Jordan methods, and LU Decomposition.
  - CO-8. Learn various types of interpolation methods such as Lagrange and Newton's methods.
  - CO-9. Learn numerical differentiation based on finite differences.
  - CO-10. Learn numerical integration by Newton Cotes formula, Trapezoidal rule and Weddle's rule.
  - CO-11. Find solution of ODEs at a given point by Euler's method.
  - CO-12. Learn about several high-level programming languages.
  - CO-13. Able to construct flowchart.
  - CO-14. Learn about various commands of computer programming.
  - CO-15. To write and run computer programme.

**Course planner**

Month	Course Topic	Teacher	No. of Classes	Remarks*
July	Probability	SM	07	Theoretical-08 Tutorial-03
	Statistics	BS	04	
August	Probability	SM	12	Theoretical-17 Tutorial-09
	Computer Programming		02	
	Statistics Numerical Analysis	BS	06 06	
Sept	Computer Programming	SM	13	Theoretical-15 Tutorial-06
	Numerical Analysis	BS	08	
Oct	Computer Programming	SM	04	Theoretical-02 Tutorial-02
Nov				Theoretical-00 Tutorial-00
Dec				Theoretical-00 Tutorial-00
Jan				Theoretical-00 Tutorial-00
Feb				Theoretical-00 Tutorial-00
Mar Apr May Jun	<b>Final Examination</b>			
	<b>Assessment:</b> Test Examination		<b>Total: 62</b>	<b>Theoretical-42 Tutorial-20</b>

**Books:**

- W. Feller, An introduction to probability theory and its applications (Vol-1)
- S. K. De, S. Sen and Banerjee, Mathematical Probability (U. N. Dhur & Sons Pvt. Ltd.)
- S. K. De and S. Sen, Mathematical Statistics (U. N. Dhur & Sons Pvt. Ltd.)
- C. Xavier, FORTRAN 77 and numerical methods (Wiley Eastern limited).
- Yashvant Kanetkar, Let us C (BPB Publications).
- Carl Erik Froberg, Introduction to Numerical Analysis (Addison Wesley Publishing).
- S. A. Molla, An Introduction to Numerical Analysis (Central Book Agency).

**Lesson Plan for Course: B.Sc. (H) Class-3<sup>rd</sup> Year Code: MTMA Paper-VII Marks: 100**

- Course Name: Vector Analysis II, Analytical Statics, Rigid Dynamics, Hydrostatics
- Course coordinator: Sudip Mondal
- Course Outcomes:
  - CO-1. Calculate line integrals as integrals of vectors and some of its applications.
  - CO-2. Verify Green's theorem, Stokes' theorem and Divergence theorem and their applications.
  - CO-3. To find the positions of equilibrium of a particle lying on a plane curve and rough surface.
  - CO-4. Determine Center of Gravity of Rigid Body.
  - CO-5. Deduce conditions of equilibrium of a particle under coplanar forces by principle of virtual work.
  - CO-6. To determine the condition of stability of equilibrium of a perfectly rough heavy body and a system of forces acting on a body.
  - CO-7. Understand D'Alembert's equations of motion.
  - CO-8. Understand the principle of conservation of energy.
  - CO-9. Understand the motion of a rigid body moving in two dimensions under finite and impulsive forces.
  - CO-10. Learn about the depth of the centre of pressure of a plane area.
  - CO-11. Find equilibrium conditions of fluids in given fields of force.
  - CO-12. To calculate the condition of stability of the equilibrium of floating bodies.
  - CO-13. Find relation between pressure and density and temperature.

**Course planner**

Month	Course Topic	Teacher	No. of Classes	Remarks*
July				Theoretical-00 Tutorial-00
August				Theoretical-00 Tutorial-00
Sept				Theoretical-00 Tutorial-00
Oct				Theoretical-00 Tutorial-00
Nov				Theoretical-00 Tutorial-00
Dec	Vector Analysis II	SM	06	Theoretical-04 Tutorial-05
	Hydrostatics	SM	03	
Jan	Analytical Statics	PD	09	Theoretical-09 Tutorial-07
	Hydrostatics	SM	05	
	Rigid Dynamics	BS	02	
Feb	Analytical Statics	PD	14	Theoretical-25 Tutorial-08
	Hydrostatics	SM	09	
	Rigid Dynamics	BS	10	
Mar	<b>Final Examination</b>			
Apr				
May				
Jun				
	<b>Assessment:</b> Test Examination		<b>Total: 58</b>	<b>Theoretical-38 Tutorial-20</b>

**Books:**

- S. L. Loney, Analytical Statics.
- M. C. Ghosh, Analytical Statics.
- S. L. Loney, Dynamics of a Particle and Rigid bodies.
- A. S. Ramsay, Hydrostatics.



**Lesson Plan for Course: B.Sc. (H) Class-3<sup>rd</sup> Year Code: MTMA Paper-VIIIA Marks: 50**

- Course Name: Algebra III, Differential Equation III, Tensor Algebra and Calculus
- Course coordinator: Sudip Mondal
- Course Outcomes:
  - CO-1. Understand Boolean algebra and functions, logic gates, switching circuits and their applications.
  - CO-2. To conceptualize the context free grammars and pushdown automata, Turing machines, Undesirability.
  - CO-3. To apply Laplace Transformations in ordinary differential equations.
  - CO-4. Find Power Series solution of ordinary differential equations.
  - CO-5. To realize tensor as generalized concept of a vector in a Euclidean space.
  - CO-6. To conceptualize of products of tensors, Christoffel symbols and their laws of transformations.

**Course planner**

Month	Course Topic	Teacher	No. of Classes	Remarks*
July				Theoretical-00 Tutorial-00
August				Theoretical-00 Tutorial-00
Sept				Theoretical-00 Tutorial-00
Oct				Theoretical-00 Tutorial-00
Nov	Algebra III (Modern)	PD	14	Theoretical-11 Tutorial-03
Dec	Algebra III (Boolean)	PD	09	Theoretical-08 Tutorial-08
	Tensor Algebra and Calculus	PD	04	
	Differential Equation III	BS	03	
Jan	Differential Equation III	BS	03	Theoretical-03 Tutorial-00
Feb	Algebra III (Linear)	SM	08	Theoretical-06 Tutorial-02
Mar	<b>Final Examination</b>			
Apr				
May				
Jun				
	<b>Assessment:</b> Test Examination		<b>Total: 41</b>	<b>Theoretical-28 Tutorial-13</b>

**Books:**

- S.K. Mapa, Modern Algebra, Sarat Book
- David Widder, Advanced Calculus (Prentice Hall)
- B. Sen, Elementary Treatise on Laplace Transform (World Press).
- Vector Analysis and Tensor Calculus (Schaum Series) – Spiegel.

**Lesson Plan for Course: B.Sc. (H) Class-3<sup>rd</sup> Year Code: MTMA Paper-VIII B Marks: 50**

- Course Name: Numerical Methods
- Course coordinator: Pintu Debnath
- Course Outcomes:
  - CO-1. To calculate function value by using Newton's forward & backward interpolation.
  - CO-2. To determine numerical integration by using Trapezoidal and Weddle's rule.
  - CO-3. To solve non-linear equations through several methods.
  - CO-4. To find numerical solution of a system of linear equations.
  - CO-5. To able to calculate Sample characteristics, Correlation coefficient, and regression lines.
  - CO-6. To write C-programming for Simpson's 1/3 rule, Newton-Raphson and Runge-Kutta methods.

**Course planner**

Month	Course Topic	Teacher	No. of Classes	Remarks*
July				Theoretical-00 Tutorial-00
August				Theoretical-00 Tutorial-00
Sept	Statistics	PD	08	Theoretical-06 Tutorial-07
	Numerical Analysis	BS	05	
Oct	Statistics	PD	08	Theoretical-07 Tutorial-08
	Computer Programming	SM	02	
	Numerical Analysis	BS	05	
Nov	Computer Programming	SM	06	Theoretical-13 Tutorial-00
	Numerical Analysis	BS	07	
Dec				Theoretical-00 Tutorial-00
Jan				Theoretical-00 Tutorial-00
Feb				Theoretical-00 Tutorial-00
Mar	<b>Final Examination</b>			
Apr				
May				
Jun				
	<b>Assessment: Test Examination</b>		<b>Total: 41</b>	<b>Theoretical-26 Tutorial-15</b>

**Books:**

- S. A. Molla, An Introduction to Numerical Analysis (Central Book Agency).
- C. Xavier, FORTRAN 77 and numerical methods (Wiley Eastern limited).
- Yashvant Kanetkar, Let us C (BPB Publications).
- S. K. De and S. Sen, Mathematical Statistics (U. N. Dhur & Sons Pvt. Ltd.)