Lesson Plan for Course: B.Sc(G) Sem-II **(**DSC**) Code:** MTMGCOR02T **Credit: 6**

- Course Name: Differential Equations
- Course coordinator: Biswajit Sarkar
- Course Outcomes:
  - CO-1. To solve first order first degree ODEs including exact and non-exact equations and higher-order ODEs including properties of Wronskian.
  - CO-2. To solve linear homogenous and non-homogeneous ODEs including Cauchy-Euler equation.
  - CO-3. To solve simultaneous and total differential equations.
  - CO-4. Able to form first order partial differential equations, to solve PDE by Lagrange's method and Charpit's method.
  - CO-5. To classify second order partial differential equations.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Feb	Linear homogenous equations with constant coefficients.	BS	02	Theoretical-02 Tutorial-00
	First order exact differential equations.	SM	04	Theoretical-04 Tutorial-00
	Order and degree of partial differential equations.	PD	02	Theoretical-02 Tutorial-00
Mar	Linear non-homogenous equations, The method of variation of parameters.	BS	04	Theoretical-03 Tutorial-01
	Integrating factors, rules to find an integrating factor.	SM	10	Theoretical-10 Tutorial-00
	Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations.	PD	06	Theoretical-05 Tutorial-01
Apr	The Cauchy-Euler equation.	BS	04	Theoretical-03 Tutorial-01
	First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations.	SM	09	Theoretical-08 Tutorial-01
	Linear partial differential equation of first order.	PD	05	Theoretical-04 Tutorial-01
	1st Internal Assessment			
May	Simultaneous differential equations.	BS	05	Theoretical-04 Tutorial-01
	Basic theory of linear differential equations, Wronskian, and its properties.	SM	09	Theoretical-09 Tutorial-00
	Lagrange's method, Charpit's method.	PD	04	Theoretical-03 Tutorial-01
Jun	Total differential equations.	BS	05	Theoretical-04 Tutorial-01
	Solving a differential equation by reducing its order.	SM	09	Theoretical-08 Tutorial-01
	Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	PD	06	Theoretical-05 Tutorial-01
	2nd Internal Assessment			
	Revision	BS SM PD	01 03 01	Theoretical-00 Tutorial-05
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 89 Hrs**	**Theoretical-74 Tutorial-15**

Books:

- Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
- Sneddon, Elements of Partial Differential Equations, McGraw-Hill, International Edition,1967.
- B. Pal, S. Raychowdhury, S. Jana, Differential Equation, Semester-II, Santra Publication Pvt. Ltd., Kolkata-700073.

Lesson Plan for Course: B.Sc(G) Sem-II (GE) **Code:** MTMHGEC02T **Credit: 6**

- Course Name: Differential Equations
- Course coordinator: Dr. Sudip Mondal
- Course Outcomes:
  - CO-1. To solve first order first degree ODEs including exact and non-exact equations and higher-order ODEs including properties of Wronskian.
  - CO-2. To solve linear homogenous and non-homogeneous ODEs including Cauchy-Euler equation.
  - CO-3. To solve simultaneous and total differential equations.
  - CO-4. Able to form first order partial differential equations, to solve PDE by Lagrange's method and Charpit's method.
  - CO-5. To classify second order partial differential equations.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Feb	Linear homogenous equations with constant coefficients.	BS	02	Theoretical-02 Tutorial-00
	First order exact differential equations.	SM	04	Theoretical-04 Tutorial-00
	Order and degree of partial differential equations.	PD	02	Theoretical-02 Tutorial-00
Mar	Linear non-homogenous equations, The method of variation of parameters.	BS	04	Theoretical-03 Tutorial-01
	Integrating factors, rules to find an integrating factor.	SM	10	Theoretical-10 Tutorial-00
	Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations.	PD	06	Theoretical-05 Tutorial-01
Apr	The Cauchy-Euler equation.	BS	04	Theoretical-03 Tutorial-01
	First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations.	SM	09	Theoretical-08 Tutorial-01
	Linear partial differential equation of first order.	PD	05	Theoretical-04 Tutorial-01
	1st Internal Assessment			
May	Simultaneous differential equations.	BS	05	Theoretical-04 Tutorial-01
	Basic theory of linear differential equations, Wronskian, and its properties.	SM	09	Theoretical-09 Tutorial-00
	Lagrange's method, Charpit's method.	PD	04	Theoretical-03 Tutorial-01
Jun	Total differential equations.	BS	05	Theoretical-04 Tutorial-01
	Solving a differential equation by reducing its order.	SM	09	Theoretical-08 Tutorial-01
	Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	PD	06	Theoretical-05 Tutorial-01
	2nd Internal Assessment			
	Revision	BS SM PD	01 03 01	Theoretical-00 Tutorial-05
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 89 Hrs**	**Theoretical-74 Tutorial-15**

For CBCS courses

Books:

- Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
- Sneddon, Elements of Partial Differential Equations, McGraw-Hill, International Edition,1967.
- B. Pal, S. Raychowdhury, S. Jana, Differential Equation, Semester-II, Santra Publication Pvt. Ltd., Kolkata-700073.

Lesson Plan for Course: B.Sc(G) Sem-IV (DSC) **Code:** MTMGCOR04T **Credit: 6**

- Course Name: Algebra
- Course coordinator: Dr. Pintu Debnath
- Course Outcomes:

CO-1. To understand equivalence relations and partitions of a set.
CO-2. To know about group, general linear group, permutation group, cyclic, general linear group and quaternion group.
CO-3. To understand subgroup, cyclic subgroups, normal subgroup, quotient group, Lagrange's theorem and its application.
CO-4. To define and understand rings and subrings.
CO-5. To conceptualize with ideals, integral domains and fields.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Feb	Definition and examples of groups, examples of abelian and nonabelian groups.	BS	02	Theoretical-01 Tutorial-01
	Equivalence relations and partitions.	SM	03	Theoretical-03 Tutorial-00
	Definition and examples of rings.	PD	02	Theoretical-01 Tutorial-01
Mar	The group Zn of integers under addition modulo n and the group Un of unit under multiplication modulo n.	BS	04	Theoretical-03 Tutorial-01
	Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set..	SM	09	Theoretical-09 Tutorial-00
	Examples of commutative and non-commutative rings: rings from number systems, Z_n the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions.	PD	06	Theoretical-05 Tutorial-01
Apr	Cyclic groups from number systems, complex roots of unity, circle group, the general linear group GLn(n,R), groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group Sym(n), Group of quaternions.	BS	04	Theoretical-03 Tutorial-01
	Subgroups.	SM	08	Theoretical-08 Tutorial-00
	Subrings.	PD	05	Theoretical-04 Tutorial-01
	1st Internal Assessment			
May	Cosets, Index of subgroup, Lagrange's theorem, order of an element,	BS	05	Theoretical-04 Tutorial-01
	Cyclic subgroups.	SM	08	Theoretical-08 Tutorial-00
	Ideals	PD	04	Theoretical-03 Tutorial-01

For CBCS courses

Jun	Normal subgroups: their definition, examples, and characterizations, Quotient groups.	BS	05	Theoretical-04 Tutorial-01
	Concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group.	SM	08	Theoretical-08 Tutorial-00
	Integral domains and fields, examples of fields: Z_p, Q, R, and C. Field of rational functions.	PD	06	Theoretical-05 Tutorial-01
	2nd Internal Assessment			
	Revision	BS SM PD	01 03 01	Theoretical-00 Tutorial-05
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 84 Hrs**	**Theoretical-69** **Tutorial-15**

Books:

- John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
- M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
- S. K. Mapa, Higher Algebra, Asoke Prakasan, Kolkata-700007

Lesson Plan for Course: B.Sc(G) Sem-IV (GE) **Code:** MTMHGEC04T **Credit: 6**

- Course name: Algebra
- Course coordinator: Dr. Sudip Mondal
- Course Outcomes:

CO-1. To understand equivalence relations and partitions of a set.
CO-2. To know about group, general linear group, permutation group, cyclic, general linear group and quaternion group.
CO-3. To understand subgroup, cyclic subgroups, normal subgroup, quotient group, Lagrange's theorem and its application.
CO-4. To define and understand rings and subrings.
CO-5. To conceptualize with ideals, integral domains and fields.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Feb	Definition and examples of groups, examples of abelian and nonabelian groups,	BS	02	Theoretical-01 Tutorial-01
	Equivalence relations and partitions.	SM	03	Theoretical-03 Tutorial-00
	Definition and examples of rings.	PD	02	Theoretical-01 Tutorial-01
Mar	the group Z_n of integers under addition modulo n and the group Un of unit under multiplication modulo n.	BS	04	Theoretical-03 Tutorial-01
	Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set..	SM	09	Theoretical-09 Tutorial-00
	Examples of commutative and non-commutative rings: rings from number systems, Z_n the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions.	PD	06	Theoretical-05 Tutorial-01
Apr	Cyclic groups from number systems, complex roots of unity, circle group, the general linear group GLn(n,R), groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group Sym(n), Group of quaternions.	BS	04	Theoretical-03 Tutorial-01
	Subgroups.	SM	08	Theoretical-08 Tutorial-00
	Subrings.	PD	05	Theoretical-04 Tutorial-01
	1st Internal Assessment			
May	Cosets, Index of subgroup, Lagrange's theorem, order of an element,	BS	05	Theoretical-04 Tutorial-01
	Cyclic subgroups.	SM	08	Theoretical-08 Tutorial-00
	Ideals	PD	04	Theoretical-03 Tutorial-01

For CBCS courses

Jun	Normal subgroups: their definition, examples, and characterizations, Quotient groups.	BS	05	Theoretical-04 Tutorial-01
	Concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group.	SM	08	Theoretical-08 Tutorial-00
	Integral domains and fields, examples of fields: Z_p, Q, R, and C. Field of rational functions.	PD	06	Theoretical-05 Tutorial-01
	2nd Internal Assessment			
	Revision	BS SM PD	01 03 01	Theoretical-00 Tutorial-05
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 84 Hrs**	**Theoretical-69** **Tutorial-15**

Books:

- John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
- M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
- S. K. Mapa, Higher Algebra, Asoke Prakasan, Kolkata-700007

Lesson Plan for Course: B.Sc(G) Sem-IV **(**DSC **&** GE**) Code:** MTMSSEC02M **Credit: 6**

- Course Name: Logic and Sets
- Course coordinator: Biswajit Sarkar
- Course Outcomes:

CO-1. To learn propositions and precedence of logical operators.

CO-2. Able to apply propositional equivalence,

CO-3. To apply predicates and quantifiers.

CO-4. To aware with sets and subsets.

CO-5. Able to understand standard operations on sets.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Feb	**Unit 1:** Introduction, propositions, truth table, negation, conjunction and disjunction.	SM	1	Theoretical-01
Mar	**Unit 1:** Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators.	SM	4	Theoretical-04
Apr	**Unit 1:** Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.	SM	3	Theoretical-03
May	**Unit 2:** Sets, subsets, Set operations. The laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set.	SM	4	Theoretical-04
Jun	**Unit 2:** Standard set operations. Classes of sets. Power set of a set.	SM	5	Theoretical-05
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 17 Hrs**	**Theoretical-17**

Books:

- R.P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.
- P.R. Halmos, Naive Set Theory, Springer, 1974.
- E. Kamke, Theory of Sets, Dover Publishers, 1950.

Lesson Plan for Course: B.Sc(G) Sem-VI **Code:** MTMGDSE03T **Credit: 6**

- Course Name: Numerical Methods
- Course coordinator: Dr. Pintu Debnath
- Course Outcomes:

CO-1. To understand the algorithm and convergence of numerical methods to solve algebraic equations through bisection, Newton, regular falsi, fixed point iteration methods.

CO-2. Able to find matrix inverse by LU decomposition, Gauss-Jacobi and Gauss-Siedel methods.

CO-3. To determine the function value throuh Lagrange and Newton interpolation foumulae.

CO-4. Capable to apply Euler's method for solving ordinary differential equations.

CO-5. Able to calculate Integration by trapezoidal rule and, Simpson's rule.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Feb	Algorithms, Convergence.	BS	3	Theoretical-03 Tutorial-00
	LU decomposition.	SM	3	Theoretical-03 Tutorial-00
Mar	Bisection method, False position method,	BS	7	Theoretical-07 Tutorial-02
	Gauss-Jacobi, Gauss-Siedel and SOR iterative methods.	SM	10	Theoretical-10 Tutorial-01
Apr	Fixed point iteration method, Newton's method, Secant method.	BS	8	Theoretical-08 Tutorial-02
	Lagrange and Newton interpolation: linear and higher order,	SM	9	Theoretical-09 Tutorial-02
	1st Internal Assessment			
May	Integration: trapezoidal rule, Simpson's rule.	BS	8	Theoretical-08 Tutorial-01
	Lagrange and Newton interpolation: finite difference operators.	SM	8	Theoretical-08 Tutorial-01
Jun	Euler's method for solving ordinary differential equations.	BS	8	Theoretical-08 Tutorial-01
	Numerical differentiation: forward difference, backward difference and central Difference.	SM	11	Theoretical-11 Tutorial-01
	2nd Internal Assessment			
	Revision	BS SM	01 03	Theoretical-00 Tutorial-04
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 79 Hrs**	**Theoretical-64** **Tutorial-15**

Books:

- S. A. Mollah, An Introduction to Numerical Analysis, Central Publication Pvt. Ltd., Kolkata-700073.

Lesson Plan for Course: B.Sc(G) Sem-VI **Code:** MTMSSEC02M **Credit: 6**

- Course Name: Logic and Sets
- Course coordinator: Biswajit Sarkar
- Course Outcomes:

CO-1. To learn several operations on sets, like difference, identities, etc.

CO-2. To understand relation on sets including its types.

CO-3. To learn partitions, equivalence relations including congruence modulo relation.

CO-4. To know partial ordering relations.

CO-5. To aware about n-ary relations on sets.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Feb	**Unit 3:** Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections.	SM	2	Theoretical-02
Mar	**Unit 3:** Relation: Product set. Composition of relations, Types of relations.	SM	7	Theoretical-07
Apr	**Unit 3:** Partitions.	SM	5	Theoretical-08
May	**Unit 3:** Equivalence Relations with example of congruence modulo relation.	SM	7	Theoretical-07
Jun	**Unit 3:** Partial ordering relations, n-ary relations.	SM	7	Theoretical-07
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 28 Hrs**	**Theoretical-28**

Books:

- R.P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.
- P.R. Halmos, Naive Set Theory, Springer, 1974.
- E. Kamke, Theory of Sets, Dover Publishers, 1950.