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*
Mar	Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation.	BS	07	Theoretical-05 Tutorial-02
	First order exact differential equations, Integrating factors, rules to find an integrating factor.	SM	17	Theoretical-16 Tutorial-01
	Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations.	PD	06	Theoretical-04 Tutorial-02
Apr	Simultaneous differential equations.	BS	02	Theoretical-01 Tutorial-01
	First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations.	SM	18	Theoretical-18 Tutorial-00
	Linear partial differential equation of first order, Lagrange's method, Charpit's method.	PD	06	Theoretical-04 Tutorial-02
	1st Internal Assessment			
May	Total differential equations.	BS	02	Theoretical-01 Tutorial-01
	Basic theory of linear differential equations, Wronskian, and its properties, Solving a differential equation by reducing its order	SM	10	Theoretical-08 Tutorial-02
	Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	PD	03	Theoretical-02 Tutorial-01
	2nd Internal Assessment			
	Revision	BS SM PD	01 01 01	Theoretical-00 Tutorial-03
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 74 Hrs**	**Theoretical-59 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*
Mar	Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation.	BS	07	Theoretical-05 Tutorial-02
	First order exact differential equations, Integrating factors, rules to find an integrating factor.	SM	17	Theoretical-16 Tutorial-01
	Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations.	PD	06	Theoretical-04 Tutorial-02
Apr	Simultaneous differential equations.	BS	02	Theoretical-01 Tutorial-01
	First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations.	SM	18	Theoretical-18 Tutorial-00
	Linear partial differential equation of first order, Lagrange's method, Charpit's method.	PD	06	Theoretical-04 Tutorial-02
	1st Internal Assessment			
May	Total differential equations.	BS	02	Theoretical-01 Tutorial-01
	Basic theory of linear differential equations, Wronskian, and its properties, Solving a differential equation by reducing its order	SM	10	Theoretical-08 Tutorial-02
	Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	PD	03	Theoretical-02 Tutorial-01
	2nd Internal Assessment			
	Revision	BS SM PD	01 01 01	Theoretical-00 Tutorial-03
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 74 Hrs**	**Theoretical-59** **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-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*
Jan	Definition and examples of groups, examples of abelian and nonabelian groups.	BS	02	Theoretical-02 Tutorial-00
		SM	00	Theoretical-00 Tutorial-00
		PD	00	Theoretical-00 Tutorial-00
Feb	The group Z_n of integers under addition modulo n and the group Un of unit under multiplication modulo n, Cyclic groups from number systems, complex roots of unity, circle group, the general linear group $GL_n(n,R)$.	BS	11	Theoretical-10 Tutorial-01
	Equivalence relations and partitions, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set..	SM	06	Theoretical-05 Tutorial-01
	Definition and examples of rings, 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	09	Theoretical-08 Tutorial-01
Mar	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, Normal subgroups: their definition, examples, and characterizations.	BS	11	Theoretical-10 Tutorial-01
	Subgroups, Cyclic subgroups.	SM	08	Theoretical-07 Tutorial-01
	Subrings, Ideals.	PD	10	Theoretical-09 Tutorial-01
	1st Internal Assessment			

Apr	Cosets, Index of subgroup, Lagrange's theorem, order of an element,	BS	10	Theoretical-09 Tutorial-01
	Concept of a subgroup generated by a subset and the commutator subgroup of group.	SM	02	Theoretical-01 Tutorial-01
	Integral domains and fields, examples of fields: Z_p, Q, R, and C.	PD	06	Theoretical-05 Tutorial-01
May	Quotient groups.	BS	05	Theoretical-04 Tutorial-01
	Examples of subgroups including the center of a group.	SM	03	Theoretical-02 Tutorial-01
	Field of rational functions.	PD	04	Theoretical-03 Tutorial-01
	2nd Internal Assessment			
	Revision	BS SM PD	01 01 01	Theoretical-00 Tutorial-03
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 90 Hrs**	**Theoretical-75** **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*
Jan	Definition and examples of groups, examples of abelian and nonabelian groups.	BS	02	Theoretical-02 Tutorial-00
		SM	00	Theoretical-00 Tutorial-00
		PD	00	Theoretical-00 Tutorial-00
Feb	The group Z_n of integers under addition modulo n and the group Un of unit under multiplication modulo n, Cyclic groups from number systems, complex roots of unity, circle group, the general linear group $GL_n(n,R)$.	BS	11	Theoretical-10 Tutorial-01
	Equivalence relations and partitions, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set..	SM	06	Theoretical-05 Tutorial-01
	Definition and examples of rings, 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	09	Theoretical-08 Tutorial-01
Mar	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, Normal subgroups: their definition, examples, and characterizations.	BS	11	Theoretical-10 Tutorial-01
	Subgroups, Cyclic subgroups.	SM	08	Theoretical-07 Tutorial-01
	Subrings, Ideals.	PD	10	Theoretical-09 Tutorial-01
	1st Internal Assessment			

Apr	Cosets, Index of subgroup, Lagrange's theorem, order of an element,	BS	10	Theoretical-09 Tutorial-01
	Concept of a subgroup generated by a subset and the commutator subgroup of group.	SM	02	Theoretical-01 Tutorial-01
	Integral domains and fields, examples of fields: Z_p, Q, R, and C.	PD	06	Theoretical-05 Tutorial-01
May	Quotient groups.	BS	05	Theoretical-04 Tutorial-01
	Examples of subgroups including the center of a group.	SM	03	Theoretical-02 Tutorial-01
	Field of rational functions.	PD	04	Theoretical-03 Tutorial-01
	2nd Internal Assessment			
	Revision	BS SM PD	01 01 01	Theoretical-00 Tutorial-03
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 90 Hrs**	**Theoretical-75** **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, Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators.	SM	09	Theoretical-09
Mar	**Unit 1:** Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.	SM	09	Theoretical-09
Apr	**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	08	Theoretical-08
May	**Unit 2:** Standard set operations. Classes of sets. Power set of a set.	SM	04	Theoretical-04
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 30 Hrs**	**Theoretical-30**

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	04	Theoretical-03 Tutorial-01
	LU decomposition.	SM	05	Theoretical-04 Tutorial-01
	Numerical differentiation: forward difference.	PD	03	Theoretical-02 Tutorial-01
Mar	Bisection method, False position method,	BS	07	Theoretical-06 Tutorial-01
	Gauss-Jacobi, Gauss-Siedel and SOR iterative methods.	SM	10	Theoretical-09 Tutorial-01
	Numerical differentiation: backward difference and central Difference.	PD	05	Theoretical-04 Tutorial-01
Apr	Fixed point iteration method, Newton's method, Secant method.	BS	07	Theoretical-06 Tutorial-01
	Lagrange and Newton interpolation: linear and higher order,	SM	06	Theoretical-05 Tutorial-01
	Euler's method for solving ordinary differential equations.	PD	05	Theoretical-04 Tutorial-01
	1st Internal Assessment			
May	Integration: trapezoidal rule, Simpson's rule.	BS	04	Theoretical-03 Tutorial-01
	Lagrange and Newton interpolation: finite difference operators.	SM	04	Theoretical-03 Tutorial-01
	Euler's method for solving ordinary differential equations.	PD	03	Theoretical-02 Tutorial-01
	2nd Internal Assessment			
	Revision	BS SM PD	01 01 01	Theoretical-00 Tutorial-03
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 66 Hrs**	**Theoretical-51 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.	BS	03	Theoretical-03
Mar	**Unit 3:** Relation: Product set. Composition of relations, Types of relations.	BS	04	Theoretical-04
Apr	**Unit 3:** Partitions, Equivalence Relations with example of congruence modulo relation.	BS	04	Theoretical-04
May	**Unit 3:** Partial ordering relations, n-ary relations.	BS	02	Theoretical-02
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 13 Hrs**	**Theoretical-13**

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.