

Lesson Plan for Course: B.Sc (Sem-I) (DSC) Code: MTMGCOR01T Credit: 6

- Course Name: Differential Calculus
- Course coordinator: Dr. Pintu Debnath
- Course Outcomes:
 - CO-1. Learn ε and δ definition of limit and continuity of a real-valued function.
 - CO-2. Apply Leibnitz's theorem to derive successive differentiation.
 - CO-3. Concept of Euler's theorem and its application on homogeneous function.
 - CO-4. Able to find out tangents, normals, curvature, asymptotes, singular points of any curves.
 - CO-5. To understand Rolle's theorem and several mean value theorems and their applications including the problems related to maxima minima and indeterminate form.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Sep	Tangents and normals, Curvature.	BS	08	Theoretical – 08 Tutorial - 00
	Rolle’s theorem, Mean Value theorems, Taylor’s theorem with Lagrange’s and Cauchy’s forms of remainder, Taylor’s series, Maclaurin’s series of $\sin x$, $\cos x$, e^x , $\log(l + x)$, $(l + x)^n$.	SM	06	Theoretical – 04 Tutorial - 02
	Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz’s theorem.	PD	10	Theoretical – 09 Tutorial - 01
Oct	Curvature.	BS	01	Theoretical – 01 Tutorial - 00
Nov	1st Internal Assessment			
	Asymptotes, Singular points.	BS	10	Theoretical – 08 Tutorial - 02
	Maxima and Minima.	SM	06	Theoretical – 04 Tutorial - 02
	Partial differentiation.	PD	08	Theoretical – 07 Tutorial - 01
Dec	Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates.	BS	07	Theoretical – 06 Tutorial - 01
	Indeterminate forms.	SM	05	Theoretical – 03 Tutorial - 02
	Euler’s theorem on homogeneous functions.	PD	09	Theoretical – 08 Tutorial - 01
	2 nd Internal Assessment			
Jan	Revision	BS	02	Theoretical – 06 Tutorial - 00
		SM	02	
		PD	02	
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		Total: 76 Hrs	Theoretical – 64 Tutorial - 12

Books:

- B. Pal, S. Raychowdhury, S. Jana, Differential Equation, Semester-III, Santra Publication Pvt. Ltd., Kolkata-700073.
- S. K. MAPA, Introduction to Real Analysis, Sarat Book Distributor, India, 2019.

For CBCS courses

➤ H. Anton, I. Birens and S. Davis, *Calculus*, John Wiley and Sons, Inc., 2002.

Lesson Plan for Course: B.Sc(Sem-I) (GE) Code: MTMHGEC01T Credit: 6

- Course Name: Differential Calculus
- Course coordinator: Dr. Sudip Mondal
- Course Outcomes:
 - CO-1. Learn ε and δ definition of limit and continuity of a real-valued function.
 - CO-2. Apply Leibnitz's theorem to derive successive differentiation.
 - CO-3. Concept of Euler's theorem and its application on homogeneous function.
 - CO-4. Able to find out tangents, normals, curvature, asymptotes, singular points of any curves.
 - CO-5. To understand Rolle's theorem and several mean value theorems and their applications including the problems related to maxima minima and indeterminate form.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Sep	Tangents and normals, Curvature.	BS	08	Theoretical – 08 Tutorial - 00
	Rolle’s theorem, Mean Value theorems, Taylor’s theorem with Lagrange’s and Cauchy’s forms of remainder, Taylor’s series, Maclaurin’s series of $\sin x$, $\cos x$, e^x , $\log(l + x)$, $(l + x)^n$.	SM	06	Theoretical – 04 Tutorial - 02
	Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz’s theorem.	PD	10	Theoretical – 09 Tutorial - 01
Oct	Curvature.	BS	01	Theoretical – 01 Tutorial - 00
Nov	1st Internal Assessment			
	Asymptotes, Singular points.	BS	10	Theoretical – 08 Tutorial - 02
	Maxima and Minima.	SM	06	Theoretical – 04 Tutorial - 02
	Partial differentiation.	PD	08	Theoretical – 07 Tutorial - 01
Dec	Tracing of curves. Parametric representation of curves and tracing of parametric curves.	BS	07	Theoretical – 06 Tutorial - 01
	Indeterminate forms.	SM	05	Theoretical – 03 Tutorial - 02
	Euler’s theorem on homogeneous functions.	PD	09	Theoretical – 08 Tutorial - 01
	2 nd Internal Assessment			
Jan	Revision	BS	02	Theoretical – 06 Tutorial - 00
		SM	02	
		PD	02	
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		Total: 76 Hrs	Theoretical – 64 Tutorial - 12

Books:

- B. Pal, S. Raychowdhury, S. Jana, *Differential Equation*, Semester-III, Santra Publication Pvt. Ltd., Kolkata-700073.
- S. K. MAPA, *Introduction to Real Analysis*, Sarat Book Distributor, India. 2019.
- H. Anton, I. Birens and S. Davis, *Calculus*, John Wiley and Sons, Inc., 2002.
- G.B. Thomas and R.L. Finney, *Calculus*, Pearson Education, 2007.

For CBCS courses

Lesson Plan for Course: B.Sc (Sem-III) (DSC) Code: MTMGCOR03T Credit: 6

- Course Name: Real Analysis
- Course coordinator: Dr. Biswajit Sarkar
- Course Outcomes:
 - CO-1. Understand some properties of sets in \mathbb{R} .
 - CO-2. Able to solve problems related with real sequence.
 - CO-3. Learn about infinite series and their tests of convergence.
 - CO-4. To understand about Sequences and series of functions.
 - CO-5. Able to find radius of convergence of power series.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Aug	Finite and infinite sets, examples of countable and uncountable sets, Real line, bounded sets, suprema and infima.	BS	03	Theoretical – 02 Tutorial - 01
	Real Sequence, Bounded sequence. Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem.	SM	07	Theoretical – 06 Tutorial - 01
	Infinite series. Cauchy convergence criterion for series. Positive term series, geometric series.	PD	06	Theoretical – 04 Tutorial - 02
Sep	Completeness property of \mathbb{R} , Archimedean property of \mathbb{R} , intervals, Concept of cluster points and statement of Bolzano-Weierstrass theorem.	BS	06	Theoretical – 04 Tutorial - 02
	Monotone sequences and their convergence (monotone convergence theorem without proof).	SM	08	Theoretical – 06 Tutorial - 02
	Comparison test, convergence of p-series, Root test, Ratio test.	PD	05	Theoretical – 04 Tutorial - 01
Oct	-----	--	00	Theoretical – 00 Tutorial - 00
Nov	1st Internal Assessment			
	Power series.	BS	04	Theoretical – 04 Tutorial - 00
	Sequences and series of functions, Pointwise and uniform convergence. M_n -test, M-test.	SM	06	Theoretical – 05 Tutorial - 01
	<i>Infinite series</i> : Alternating series, Leibnitz's test (Tests of Convergence without proof).	PD	05	Theoretical – 04 Tutorial - 01
Dec	Radius of convergence Power series.	BS	05	Theoretical – 04 Tutorial - 01
	Statements of the results about uniform convergence and integrability and differentiability of functions.	SM	06	Theoretical – 04 Tutorial - 02
	<i>Infinite series</i> : Definition and examples of absolute and conditional convergence.	PD	04	Theoretical – 03 Tutorial - 01
	2nd Internal Assessment			
Jan	Revision	BS SM PD	02 02 02	Theoretical – 06 Tutorial - 00
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		Total: 71 Hrs	Theoretical – 56 Tutorial - 15

Books:

- B. Pal, S. Raychowdhury, S. Jana, Differential Equation, Semester-III, Santra Publication Pvt. Ltd., Kolkata-700073.
- S. K. MAPA, Introduction to Real Analysis, Sarat Book Distributor, India, 2019.
- K.A. Ross, *Elementary Analysis- The Theory of Calculus Series*- Undergraduate Texts in Mathematics, Springer Verlag, 2003.
- E. Fischer, *Intermediate Real Analysis*, Springer Verlag, 1983.
- T.M. Apostol, *Calculus* (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.

Lesson Plan for Course: B.Sc (Sem-III) (DSC) Code: MTMSSEC01M Credit: 6

- Course Name: C-Programming Language
- Course coordinator: Dr. Biswajit Sarkar
- Course Outcomes:
 - CO-1. Learn high-level programming languages.
 - CO-2. Able to construct flowchart.
 - CO-3. To know about some arithmetic operators and logical operators.
 - CO-4. Able to use for loop, while loop and do-while loop in C-programming.
 - CO-5. Capable to write programming for finding out maximum, minimum of a given set of numbers.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Aug	Unit-1: Basics of Computer Programming: Definition, Requirement of programming language, Machine language, high-level programming languages, machine code of a program: compilation process, Problem solving approaches: algorithm and flowchart.	SM	04	Theoretical-03 Tutorial-01
Sep	Unit-2: Fundamentals of Programming: Built in Data Types: int, float, double, char; Constants and Variables; first program: printf(), scanf(), compilation etc., keywords, Arithmetic operators: precedence and associativity, Assignment Statements: post & pre increment/decrement, logical operators: and, or, not.	SM	08	Theoretical-07 Tutorial-01
Oct	-----	--	00	Theoretical-00 Tutorial-00
Nov	Unit-3: Statements: Relational operators, if-else statement.	SM	07	Theoretical-06 Tutorial-01
Dec	Unit-3: Statements: Iterative Statements: for loop, while loop and do-while loop; controlling loop execution: break and continue, nested loop.	SM	07	Theoretical-06 Tutorial-01
End Semester Examination (By Department)				
	Assessment: Assignment		Total: 26 Hrs	Theoretical-22 Tutorial-04

Books:

- Yashavant Kanetkar, Let Us C , BPB Publications, 2016.
- Kamthane AN. Programming in C, 2/e. Pearson Education India; 2011.
- Satbir Mehla, Vishakha Gupta, M.L. Jain, Amit Sehgal, New College Programming in C and Numerical Methods For B.A./B.Sc., Jeevansons Publications, India, Ninth Revised Edition, 2015.
- C. Xavier : C-Language and Numerical Methods, New Age International.

Lesson Plan for Course: B.Sc(Sem-III) (GE) Code: MTMHGEC03T Credit: 6

- Course Name: Real Analysis
- Course coordinator: Dr. Pintu Debnath
- Course Outcomes:
 - CO-6. Understand some properties of sets in \mathbb{R} .
 - CO-7. Able to solve problems related with real sequence.
 - CO-8. Learn about infinite series and their tests of convergence.
 - CO-9. To understand about Sequences and series of functions.
 - CO-10. Able to find radius of convergence of power series.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Aug	Finite and infinite sets, examples of countable and uncountable sets, Real line, bounded sets, suprema and infima.	BS	03	Theoretical – 02 Tutorial - 01
	Real Sequence, Bounded sequence. Cauchy convergence criterion for sequences. Cauchy’s theorem on limits, order preservation and squeeze theorem.	SM	07	Theoretical – 06 Tutorial - 01
	Infinite series. Cauchy convergence criterion for series. Positive term series, geometric series.	PD	06	Theoretical – 04 Tutorial - 02
Sep	Completeness property of R, Archimedean property of R, intervals, Concept of cluster points and statement of Bolzano-Weierstrass theorem.	BS	06	Theoretical – 04 Tutorial - 02
	Monotone sequences and their convergence (monotone convergence theorem without proof).	SM	08	Theoretical – 06 Tutorial - 02
	Comparison test, convergence of p-series, Root test, Ratio test.	PD	05	Theoretical – 04 Tutorial - 01
Oct	-----	--	00	Theoretical – 00 Tutorial - 00
Nov	1 st Internal Assessment			
	Power series.	BS	04	Theoretical – 04 Tutorial - 00
	Sequences and series of functions, Pointwise and uniform convergence. M_n -test, M-test.	SM	06	Theoretical – 05 Tutorial - 01
	<i>Infinite series</i> : Alternating series, Leibnitz’s test (Tests of Convergence without proof).	PD	05	Theoretical – 04 Tutorial - 01
Dec	Radius of convergence Power series.	BS	05	Theoretical – 04 Tutorial - 01
	Statements of the results about uniform convergence and integrability and differentiability of functions.	SM	06	Theoretical – 04 Tutorial - 02
	<i>Infinite series</i> : Definition and examples of absolute and conditional convergence.	PD	04	Theoretical – 03 Tutorial - 01
	2 nd Internal Assessment			
Jan	Revision	BS	02	Theoretical – 06 Tutorial - 00
		SM	02	
		PD	02	
End Semester Examination				
	Assessment: Internal Assessment & Assignment		Total: 71 Hrs	Theoretical – 56 Tutorial - 15

Books:

- B. Pal, S. Raychowdhury, S. Jana, Differential Equation, Semester-III, Santra Publication Pvt. Ltd., Kolkata-700073.
- S. K. MAPA, Introduction to Real Analysis, Sarat Book Distributor, India. 2019.
- K.A. Ross, *Elementary Analysis- The Theory of Calculus Series*- Undergraduate Texts in Mathematics, Springer Verlag, 2003.
- E. Fischer, *Intermediate Real Analysis*, Springer Verlag, 1983.
- T.M. Apostol, *Calculus* (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.

Lesson Plan for Course: B.Sc (Sem-III) (GE) Code: MTMSSEC01M Credit: 6

- Course Name: C-Programming Language
- Course coordinator: Dr. Biswajit Sarkar
- Course Outcomes:
 - CO-1. Learn high-level programming languages.
 - CO-2. Able to construct flowchart.
 - CO-3. To know about some arithmetic operators and logical operators.
 - CO-4. Able to use for loop, while loop and do-while loop in C-programming.
 - CO-5. Capable to write programming for finding out maximum, minimum of a given set of numbers.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Aug	Unit-1: Basics of Computer Programming: Definition, Requirement of programming language, Machine language, high-level programming languages, machine code of a program: compilation process, Problem solving approaches: algorithm and flowchart.	SM	04	Theoretical-03 Tutorial-01
Sep	Unit-2: Fundamentals of Programming: Built in Data Types: int, float, double, char; Constants and Variables; first program: printf(), scanf(), compilation etc., keywords, Arithmetic operators: precedence and associativity, Assignment Statements: post & pre increment/decrement, logical operators: and, or, not.	SM	08	Theoretical-07 Tutorial-01
Oct	-----	--	00	Theoretical-00 Tutorial-00
Nov	Unit-3: Statements: Relational operators, if-else statement.	SM	07	Theoretical-06 Tutorial-01
Dec	Unit-3: Statements: Iterative Statements: for loop, while loop and do-while loop; controlling loop execution: break and continue, nested loop.	SM	07	Theoretical-06 Tutorial-01
End Semester Examination (By Department)				
	Assessment: Assignment		Total: 26 Hrs	Theoretical-22 Tutorial-04

Books:

- Yashavant Kanetkar, Let Us C , BPB Publications, 2016.
- Kamthane AN. Programming in C, 2/e. Pearson Education India; 2011.
- Satbir Mehla, Vishakha Gupta, M.L. Jain, Amit Sehgal, New College Programming in C and Numerical Methods For B.A./B.Sc., Jeevansons Publications, India, Ninth Revised Edition, 2015.
- C. Xavier : C-Language and Numerical Methods, New Age International.

Lesson Plan for Course: B.Sc (Sem-V) (DSC) Code: MTMGDSE01T Credit: 6

- Course Name: Matrices
- Course coordinator: Dr. Sudip Mondal
- Course Outcomes:
 - CO-1. To form vector space and subspace over \mathbb{R} and to find their standard basis.
 - CO-2. To conceptualize translation, dilation, rotation, reflection in a point, line and plane (in matrix form) and able to interpret eigen values and eigen vectors of these transformations including eigen spaces.
 - CO-3. Able to calculate rank of matrices, to reduce in normal form and to solve linear homogeneous and non-homogeneous equations.
 - CO-4. Able to reduce matrices to diagonal form through eigen values and eigen vectors.
 - CO-5. Capable to applying elementary row operations to compute matrix rank and inverses, and to solve system of linear equations.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Aug	Unit-1: R, R ² , R ³ as vector spaces over R. Standard basis for R.	PD	04	Theoretical – 03 Tutorial - 01
	Unit-2: Translation, Dilation.	BS	03	Theoretical – 03 Tutorial - 01
	Unit-3: Types of matrices. Rank of a matrix. Invariance of rank under elementary transformations.	SM	08	Theoretical – 06 Tutorial - 02
Sep	Unit-1: Standard basis for each of vector spaces R ² , R ³ . Concept of Linear Independence and examples of different bases. Subspaces of R ² , R ³ .	PD	07	Theoretical – 05 Tutorial - 02
	Unit-2: Rotation, Reflection in a point.	BS	04	Theoretical – 03 Tutorial - 01
	Unit-3: Reduction to normal form. Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns up to four.	SM	09	Theoretical – 08 Tutorial - 01
Oct	Unit-2: Reflection in a line and plane.	BS	01	Theoretical – 01 Tutorial - 00
Nov	1 st Internal Assessment			
	Unit-2: Interpretation of eigen values and eigen vectors for such transformations.	PD	04	Theoretical – 03 Tutorial - 01
	Unit-2: Matrix form of basic geometric transformations.	BS	05	Theoretical – 04 Tutorial - 01
	Unit-4: Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix.	SM	09	Theoretical – 08 Tutorial - 01
Dec	Unit-2: Eigen spaces as invariant subspaces.	PD	05	Theoretical – 04 Tutorial - 01
	Unit-2: Matrix form of basic geometric transformations.	BS	04	Theoretical – 03 Tutorial - 01
	Unit-4: Solutions of a system of linear equations using matrices. Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.	SM	09	Theoretical – 07 Tutorial - 02
	2 nd Internal Assessment			
Jan	Revision	PD	02	Theoretical – 06 Tutorial - 00
		BS	02	
		SM	02	
	End Semester Examination			

	Assessment: Internal Assessment & Assignment		Total: 79 Hrs	Theoretical –64 Tutorial - 15
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Books:

- A.I. Kostrikin, *Introduction to Algebra*, Springer Verlag, 1984.
- S. H. Friedberg, A. L. Insel and L. E. Spence, *Linear Algebra*, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
- Richard Bronson, *Theory and Problems of Matrix Operations*, Tata McGraw Hill, 1989.
- S. K. MAPA, *Higher Algebra*, Sarat Book Distributor, India. 2019.

Lesson Plan for Course: B.Sc (Sem-V) (DSC) Code: MTMSSEC01M Credit: 6

- Course Name: C-Programming Language
- Course coordinator: Dr. Sudip Mondal
- Course Outcomes:
 - CO-1. To understand arrays and multi-dimensional arrays.
 - CO-2. Able to use arrays and multi-dimensional arrays in C-programming.
 - CO-3. To understand about functions.
 - CO-4. Capable to write programming by using functions.
 - CO-5. Able to write programming C languages like n!, nCr, etc.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Aug	Unit-4: Arrays: Definition & requirement, declaration & initialization, indexing.	BS	04	Theoretical-03 Tutorial-01
Sep	Unit-4: Arrays: One dimensional array: finding maximum, minimum, Simple sorting and searching. Unit-5: Multi-dimensional arrays: Matrix Manipulations (Addition)	BS	06	Theoretical-04 Tutorial-02
Oct	----	--	00	Theoretical-00 Tutorial-00
Nov	Unit-5: Multi-dimensional arrays: Matrix Manipulations (Multiplication, Transpose), Arrays and Pointers, Memory allocation and deallocation: <i>malloc()</i> and <i>free()</i> functions.	BS	06	Theoretical-04 Tutorial-02
Dec	Unit-6: Functions: Why?, How to declare, define and invoke a function, Variables' scope, local & global variables and function parameters, Pointers, arrays as function parameters, <i>return</i> statement, Header files and their role. Illustrate different examples like swapping values, compute n!, nCr, find max/min from a list of elements, sort a set of numbers, matrix addition/ multiplication etc.	BS	06	Theoretical-04 Tutorial-02
End Semester Examination (By Department)				
	Assessment: Assignment		Total: 22 Hrs	Theoretical-15 Tutorial-07

Books:

- Yashavant Kanetkar, Let Us C, BPB Publications, 2016.
- Kamthane AN. Programming in C, 2/e. Pearson Education India; 2011.
- Satbir Mehla, Vishakha Gupta, M.L. Jain, Amit Sehgal, New College Programming in C and Numerical Methods For B.A./B.Sc., Jeevansons Publications, India, Ninth Revised Edition, 2015.
- C. Xavier : C-Language and Numerical Methods, New Age International.