

Syllabus

Mathematics (Regular)

submitted to



Gauhati University

under the

Choice Based Credit System

By

Department of Mathematics

Gauhati University

Credits allocation for the Regular courses:

Course	*Credits	*Credits
Theory + Practical	Theory + Tutorial	Theory + Practical
I. Core Course (6 Credits)		
(12 Papers)	12×4= 48	12×5=60
04 Courses from each of the 03 disciplines of choice		
Core Course Practical / Tutorial*		
(12 Practical/Tutorials*)	12×2=24	12×1=12
04 Courses from each of the 03 disciplines of choice		
II. Elective Course (6 Credits)		
(6 Papers)	6×4=24	6×5=30
Two papers from each discipline of choice including paper of interdisciplinary nature		
Elective Course Practical / Tutorial*	6 × 2=12	6×1=6
Two papers from each discipline of choice including paper of interdisciplinary nature		
Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6th Semester		
III. Ability Enhancement Courses		
1. Ability Enhancement Compulsory Courses (AECC) (2 Papers of 4 credit each)	2 × 4=8	2 × 4=8
Environmental Science		
English Communication		
2. Skill Enhancement Courses (SEC) (4 Papers of 4 credit each)	4 × 4=16	4× 4=16
Total credit	132	132

* wherever there is a practical there will be no tutorial and vice-versa

Core papers (Mathematics):

1. MAT-RC-1016: Calculus
2. MAT-RC-2016: Algebra
3. MAT-RC-3016: Differential Equations
4. MAT-RC-4016: Real Analysis

Skill Enhancement Course (SEC) papers

SEC-1

MAT-SE-3014: Computer Algebra Systems and Related Software

SEC-2

MAT-SE-4014: R Programming

SEC-3

MAT-SE-5014: Combinatorics and Graph Theory

SEC-4

MAT-SE-6014: LaTeX and HTML

Discipline Specific Elective (DSE) papers

DSE-1 (Choose one)

MAT-RE-5116: Number Theory

MAT-RE-5126: Discrete Mathematics

DSE-2 (Choose one)

MAT-RE-6116: Numerical Analysis

MAT-RE-6126: Programming in C

SEMESTER-II MAT-RC-2016: Algebra

Total Marks: 100 (External: 80, Internal Assessment: 20)

Per week 5 Lectures, 1 Tutorial, Credits 6

Each unit carry equal credit

Unit 1: Theory of Equations and Expansions of Trigonometric Functions:

Fundamental Theorem of Algebra, Relation between roots and coefficients of n th degree equation, Remainder and Factor Theorem, Solutions of cubic and biquadratic equations, when some conditions on roots of the equation are given, Symmetric functions of the roots for cubic and biquadratic; De Moivre's theorem (both integral and rational index), Solutions of equations using trigonometry and De Moivre's theorem, Expansion for in terms of powers of in terms of cosine and sine of multiples of x .

[2] Chapter 3, Chapter 4 [3] Chapter 7 (Sections 7.6, and 7.7)

Unit 2: Matrices: Types of matrices, Rank of a matrix, Invariance of rank under elementary transformations, Reduction to normal form, Solutions of linear homogeneous and nonhomogeneous equations with number of equations and unknowns up to four; Cayley-Hamilton theorem, Characteristic roots and vectors.

[4] Chapter 3 (Sections 3.2, 3.5, 3.7, 3.9) Chapter 2 (Sections 2.1 to 2.5) Chapter 7 (Section 7.1, and Example 7.2.2)

Unit 3: Groups, Rings and Vector Spaces: Integers modulo n , Permutations, Groups, Subgroups, Lagrange's theorem, Euler's theorem, Symmetry Groups of a segment of a line, and regular n -gons for $n = 3, 4, 5$ and 6 ; Rings and subrings in the context of $C[0,1]$ and Definition and examples of a vector space, Subspace and its properties, Linear independence, Basis and dimension of a vector space.

[1] Chapter 1 (Section 1.4), and Chapter 2 (Section 2.3) Chapter 3 (Sections 3.1, 3.2, 3.3 and 3.6), and Chapter 5 (Section 5.1) [4] Chapter 4 (Sections 4.1, 4.3 and 4.4)

Text Books:

1. Beachy, John A., & Blair, William D. (2006). *Abstract Algebra* (3rd ed.). Wavel and Press, Inc.
2. Burnside, William Snow (1979). *The Theory of Equations*, Vol. 1 (11th ed.) S. Chand & Co. Delhi. Fourth Indian Reprint.
3. Gilbert, William J., & Vanstone, Scott A. (1993). *Classical Algebra* (3rd ed.). Waterloo Mathematics Foundation, Canada.
4. Meyer, Carl D. (2000). *Matrix Analysis and Applied Linear Algebra*. Society for Industrial and Applied Mathematics (Siam).

Reference Books:

1. Dickson, Leonard Eugene (2009). *First Course in The Theory of Equations*. The Project Gutenberg EBook (<http://www.gutenberg.org/ebooks/29785>)
2. Gilbert, William J. (2004). *Modern Algebra with Applications* (2nd ed.). Wiley Interscience, John Wiley & Sons.