

## SILPATHAR SCIENCE COLLEGE

### Programme Outcomes:

**Silapathar Science College** offers three-year undergraduate Bachelor in Science Honours degree programmes in **Anthropology, Botany, Chemistry, Mathematics, Physics and Zoology** affiliated under Dibrugarh University.

The College also offers **Master in Science degree (Prog) in Zoology and Botany** affiliated under Assam Science and Technology University (ASTU).

The learning outcomes of graduate programmes yields disciplinary knowledge and understanding, generic skills, including global abilities that all students in different academic fields of study should acquire and demonstrate. Some of the programme outcomes in general are as follows:

***Disciplinary knowledge:*** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

- ***Communication Skills:*** The different programmes greatly infuses to express thoughts and ideas effectively in writing and orally; also helps to communicate with others using different media; positively share one's views and express herself; establish the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
- ***Critical Thinking:*** Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
- ***Problem Solving:*** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
- ***Analytical reasoning:*** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
- ***Research-related skills:*** A sense of inquiry and capability for asking relevant/appropriate questions, problem solving, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

- **Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
- **Scientific Reasoning:** Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
- **Reflective thinking:** Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.
- **Information/digital Literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
- **Self-directed Learning:** Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion..
- **Moral and Ethical awareness/reasoning:** Ability to hold moral/ethical values in conducting one's life, express a position/argument about an ethical issue from multiple perceptions, and use ethical practices in all work.
- **Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision.
- **Lifelong Learning:** Ability to acquire knowledge and skills, including learning how to learn, "that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trade."

Programme Name	Programme specific Outcomes
<b>Bsc. (Hon.) Anthro</b>	1. Motivate to critical thinking without any preconceived ideas. 2. Develop comprehensive knowledge and understanding of Anthropology 3. Equip students for action and applied research 4. Continue to acquire relevant knowledge and theories required for higher studies 5. Awareness for ethical studies and ethical issues particularly during compulsory field work

<b>Bsc. (Hon.) Botany</b>	<ol style="list-style-type: none"> <li>1. Understand the various external and internal morphology and origin and evolution of different plant and animal species.</li> <li>2. Explain the problems of environmental problems including pollution and their control measures.</li> <li>3. Develop a deeper understanding of natural laws inquiring about the reasons and logics which govern them through established methods of observation, experimentation and calculation.</li> <li>4. Take up further advanced studies in the respective subject.</li> </ol>
<b>Bsc. (Hon.) Chemistry</b>	<ol style="list-style-type: none"> <li>1. Get a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Analytical, Inorganic, Organic and Physical Chemistries.</li> <li>2. Design and carry out scientific experiments as well as accurately record and analyze the results of such experiments</li> <li>3. Demonstrate problem solving skills, critical thinking and analytical reasoning as applied to scientific problems.</li> <li>4. Explain why chemistry is an integral activity for addressing social, economic, and environmental problems.</li> </ol>
<b>Bsc. (Hon.) Maths</b>	<ol style="list-style-type: none"> <li>1. Familiarize the students with suitable tools of mathematical analysis to handle issues and problems in mathematics and related sciences.</li> <li>2. Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of mathematics and statistics.</li> <li>3 Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in mathematics and its allied areas on multiple disciplines concerned with mathematics.</li> </ol>
<b>Bsc. (Hon.) Physics</b>	<ol style="list-style-type: none"> <li>1. To understand the basic laws and explore the fundamental concepts of physics</li> <li>2. To understand the concepts and significance of the various physical phenomena.</li> <li>3. To carry out experiments to understand the laws and concepts of Physics.</li> <li>4. This course introduces students to the methods of experimental physics. Emphasis will be given on laboratory techniques specially the importance of accuracy of measurements.</li> </ol>

<p><b>Bsc. (Hon.) Zoology</b></p>	<ol style="list-style-type: none"> <li>1. Students gain knowledge and skill in the fundamentals of animal sciences, understands the complex interactions among various living organisms.</li> <li>2. Analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment</li> <li>3. Apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms</li> <li>4. Understanding of environmental conservation processes and its importance, pollution control and biodiversity and protection of endangered species</li> <li>5. Gain knowledge of Agro based Small Scale industries like sericulture, fish farming, butterfly farming and vermicomposting preparation.</li> </ol>
<p><b>M.Sc. in Botany</b></p>	<ol style="list-style-type: none"> <li>1. Understand the various external and internal morphology and origin and evolution of different plant and animal species.</li> <li>2. Explain the problems of environmental problems including pollution and their control measures.</li> <li>3. Develop a deeper understanding of natural laws inquiring about the reasons and logics which govern them through established methods of observation, experimentation and calculation.</li> <li>4. It will deliver a huge research prospects.</li> </ol>
<p><b>M.Sc. in Zoology</b></p>	<ol style="list-style-type: none"> <li>1. Analyze complex interactions among the various animals of different phyla, their distribution and their relationship with the environment</li> <li>2. Apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms.</li> <li>3. Understanding of environmental conservation processes and its importance, pollution control and biodiversity and protection of endangered species.</li> </ol>



**DIBRUGARH UNIVERSITY REGULATIONS FOR THE UNDER GRADUATE  
ACADEMIC PROGRAMMES IN THE CHOICE BASED CREDIT SYSTEM  
(CBCS), 2018**

*(With modifications in 2016 Regulations as recommended by the 120<sup>th</sup> Meeting of the Under Graduate Board held on 19.11.2018 and approved the 115<sup>th</sup> Meeting of the Academic Council, Dibrugarh University held on 21.11.2018)*

**(1) Short title, definitions and commencement:**

These Regulations shall be called the Dibrugarh University Regulations for the Under Graduate Academic Programmes in the Choice Based Credit System, 2018. These Regulations shall be effective for the Courses of Study leading to the Bachelor Degree(s) in Arts (BA), Science (B.Sc.) and Commerce (B.Com), which shall be of three years duration comprising of six semesters. Hereinafter, it will be referred to as DU-UGCBCS Regulations, 2018.

The Regulations shall come into effect from the Academic Session, 2019-2020.

The Regulations shall be applicable to the students enrolled in the aforementioned Academic Programmes under CBCS conducted by the Colleges/ Institutes affiliated to/ permitted by Dibrugarh University from the Academic session 2019-2020.

**2 Short Title, Definitions and Commencement:**

**2.1 Definitions:**

- a) CBCS: CBCS means Choice Based Credit System. Choice Based Credit System is a flexible system of learning. 'Credit' defines the quantum of contents/ syllabus prescribed for a course and determines the number of hours of instruction required. This system permits students to-
- learn at their own pace
  - choose electives from a wide range of Elective Courses offered for the programme
  - undergo additional courses and acquire more than the required number of credits
  - adopt an inter-disciplinary approach in learning
  - make best use of the expertise of available faculty.
- b) College: The term 'College' means the Colleges and Institutes affiliated to or permitted by Dibrugarh University for conducting different academic programmes.
- c) Department: The term 'Department' is used to mean a Department of a College/ Institute affiliated to/ permitted by Dibrugarh University.
- d) Programme: The term 'programme' is used to mean the whole learning

experience or combination of courses in a particular field of study.

- e) Course: A Programme is divided into a number of courses. A course is a unit of instruction or segment of subject area under any programme. The traditional concept 'paper' is replaced by 'course'.
- f) Academic Year: An academic year means a period of twelve months consisting of two semesters.
- g) Semester: The word "semester" is used to mean a half-yearly term or term of studies including examinations, vacations and semester breaks
- h) Semester Duration: A semester normally extends over a period of 15 class weeks. Each week has 30 hours of instruction spread over the week.
- i) In – semester: The word "in-semester" is used to refer to the continuous evaluation within the half-yearly term.
- j) End-semester: The word "end-semester" is used to refer to the terminal processes of examinations and evaluations at the end but within the half-yearly term.
- k) Credit: 'Credit' defines the quantum of contents/ syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, normally in each of the course, credits will be assigned on the basis of the number of lectures/ tutorials/ laboratory work and other forms of learning required to complete the course contents in a 14-15 week schedule:
  - i) 1 Lecture per week = 1 Hour duration per week =1 Credit
  - ii) 1 Tutorial per week = 1 Hour duration per week =1 Credit
  - iii) 1 Practical per week = 2 Hours duration per week =1 Credit

### 3. Course Structure

3.1 The Course Structure of the Academic Programmes under the CBCS shall be as per the Course Structure given in *Annexure I*. The nature of the Courses for all Under Graduate Academic programmes shall be as below:

**a) Core Courses:** Compulsory components of an Academic Programme. These Courses are to be compulsorily studied as a core requirement for the programme. The contents of the Core Courses shall be as per the UGC Model Curriculum for the subject/ discipline concerned. However, the Boards of Studies concerned may recommend maximum of 20% deviation from the UGC Model Syllabi wherever requires.

**b) Elective Courses:** Elective courses shall be chosen by each student from a pool of courses. These courses may be intra-departmental, i.e. Discipline Specific Elective (DSE) as well as inter-departmental, i.e., Generic Elective (GE). The students shall have to choose minimum number of DSE and GE in every semester as prescribed in the Course Structure. These courses shall be:

- (i) supportive to the discipline of study
- (ii) providing an expanded scope
- (iii) enabling an exposure to some other discipline/ domain

### 5. Examination and Evaluation

(a) Examination and evaluation shall be done on a continuous basis, at least three times

during each semester.

- (b) There shall be 20% marks for internal assessment and 80% marks for End-semester examination in each course during every semester.
- (c) There shall be no provision for re-evaluation of the answer-scripts of the end-semester examinations. However, a candidate may apply for re-scrutiny.

**(d) Internal Assessment:**

- (i) In internal assessment, different tools such as objective tests, written tests, assignments, paper presentation, laboratory work, etc. suitable to the courses may be employed. The Procedure for Internal Assessment is prescribed in **Annexure III**.
- (ii) The students shall be informed in advance about the nature of assessment. Students shall be required to compulsorily attend internal assessment including appearing the Sessional Tests, failing which they will not be allowed to appear for the End-semester examination. A Student cannot repeat In-semester examinations. The department may arrange special in-semester examination whenever necessary.

**(e) End Semester Examination:**

- (i) There shall be one End semester examination carrying 80% Marks in each course of a Semester covering the entire syllabus prescribed for the Course. The End semester examination is normally a written/ laboratory-based examination/Project Work/Dissertation.
- (ii) The Controller of Examinations shall make necessary arrangements for notifying the dates of the End semester examinations and other procedures as per Dibrugarh University Rules (at least 20 days in advance) and the Academic Calendar notified by the University.
- (iii) Normally, the End-semester examination for each course shall be of three hour duration.

**4. Grading System**

4.1 The absolute grading system shall be applied in evaluating performance of the students.

The following scale of grading system shall be applied to indicate the performances of students in terms of letter grade and grade points as given below:

<b>O</b>	<b>Outstanding</b>	<b>10 (Marks securing above 90%)</b>
<b>A+</b>	<b>Excellent</b>	<b>9 (Marks securing 80%-90%)</b>
<b>A</b>	<b>Very Good</b>	<b>8(Marks securing 70% -80%)</b>
<b>B+</b>	<b>Good</b>	<b>7(Marks securing 60% -70%)</b>
<b>B</b>	<b>Above Average</b>	<b>6(Marks securing 50% -60%)</b>
<b>P</b>	<b>Pass</b>	<b>5 (Marks securing 40% -50%)</b>
<b>F</b>	<b>Fail</b>	<b>0(Marks securing below 40%)</b>
<b>Abs</b>	<b>Absent/ Incomplete</b>	<b>0</b>

### Detailed Course Structure of the Under Graduate Academic Programmes under CBCS of Dibrugarh University

#### A. Details of courses under B.Sc. (Honors)

Course

**\*Credits**

Theory+ Practical

Theory + Tutorial

#### 1. Core Course (6 Credits)

(14 Courses)

14X (4+2)= 84

14X (5+1)=84

#### Core Course Practical / Tutorial\*

#### I. Elective Course (6 Credits)(8 Courses)

A.1. Discipline Specific Elective

4X (4+2) =24

4X (5+1) =24



(4 Courses)

Discipline Specific Elective Practical/ Tutorial\*

B.1. Generic Elective/Interdisciplinary 4X (4+2)= 24 4X (5+1)= 24

(4Courses) Generic Elective Practical/ Tutorial\*

\* Optional Dissertation or project work in place of one Discipline Specific Elective Course (6 credits) in 6<sup>th</sup> Semester

### SEMESTER WISE DISTRIBUTION OF COURSES

Sem	CORE COURSE (14)	Ability Enhancement Compulsory Course (AECC) (2)	Skill Enhancement Course (SEC) (2)	Elective: Discipline Specific DSE (4)
I	C 1 (6C)	AECC 1 Communicative English (2 C)		
	C 2 (6C)	AECC 2 MIL/ Communicative Hindi/ Alternative English (2C)		
II	C 3 (6C)	AECC 3 Environmental Science (2C)		
	C 4 (6C)			

III	C 5(6C)		SEC-1.1 (2C)	
	C 6(6C)			
	C 7(6C)			
IV	C 8(6C)		SEC-2.1 (2C)	
	C 9(6C)			
	C 10(6C)			
V	C 11(6C)			DSE-1 (6C)
	C 12 (6C)			DSE-2(6C)
VI	C 13(6C)			DSE-3(6C)
	C 14(6C)			DSE-4(6C)

**Course Outcomes:**

<b>Programme+ Semester</b>	<b>Course Name</b>	<b>Course Outcome</b>
<b>B.Sc. (HON.) Anthro</b>	<b>ANTH-101: Introduction to Biological Anthropology</b>	1.Student will get an information background of social cultural Anthropology 2. Basic introduction about socio- cultural Anthropology its historical background aims and objectives.
<b>Semester I</b>	<b>Introduction to Socio-cultural Anthropology</b>	
<b>Semester II</b>	<b>ANTH-201 Archaeological Anthropology</b>	1.Generic of Archaeology Definition of Archaeology
	<b>ANTH-202 Fundamentals of Human Origin &amp; Evolution</b>	

<b>Semester III</b>	<b>ANTH-301 Tribes and Peasants in India</b>	<p>1. Students will be able to define and understand the characteristic features of Tribes and Peasants.</p> <p>2. To know the background and tribal problems and identity.</p>
	<b>ANTH-302 Human Ecology: Biological &amp; Cultural dimensions</b>	
	<b>ANTH-303 Biological Diversity in Human Populations</b>	
<b>Semester IV</b>	<b>ANTH-401 Theories of Culture and Society</b>	<p>1. Students will be able to understand Emergence of Anthropology: Interface with evolutionary theory and colonialism, changing perspectives on Evolutionism, Diffusionism and Culture area theories.</p>
	<b>ANTH-402 Human Growth and Development</b>	<p>1. Concept of human growth, 1. Students will be able to understand development, differentiation and maturation. Evolutionary perspective on human growth (including living primates and fossil human ancestors)</p>
<b>Semester IV</b>	<b>ANTH-403 Research Methods</b>	
<b>Semester V</b>	<b>ANTH-501 Human Population Genetics</b>	<p>1. Students will be able to understand landmarks in the history of genetics, principles in human genetics, single locus (Mendelian) versus multilocus (quantitative/complex) inheritance, chromosome theory of inheritance (segregation and independent assortment) Mendelian inheritance (single factor and multifactorial inheritance, polygenic inheritance), Non- Mendelian inheritance (multiple allelism, Co-dominance; sex linked, epistasis; penetrance and expressivity; Cytoplasmic inheritance</p>
	<b>ANTH-502 Anthropology in Practice</b>	<p>1. Anthropology and Public Policy, Need Assessment and Community Development, Anthropology of NGO's, Management Anthropology, Environment and</p>

		Community Health, Social and economic sustainability, Cultural resource management
<b>Semester VI</b>	<b>ANTH-601 Dissertation</b>	
	<b>ANTH-602 Anthropology of India</b>	
<b>B.Sc. (HON.) Botany</b>             <b>Semester I</b>	<b>Paper 1: Microbiology and Phycology</b>	1. The objective of this course is to provide knowledge to the students on various forms of microbes and algae - their characteristics and economic importance

Paper 2: **Biomolecules and Cell Biology**

1. The objective of this course is to expose the students on molecular organisations life and also discusses cellular and molecular processes of life.

<b>Semester II</b>	<b>Paper 3: Mycology and Phytopathology</b>	1.The objective of this course is to expose the students on the fungal world, different fungal diseases; their economic importances etc
	<b>Paper 4: Archegoniate</b>	1.The objective of this course is to expose the students on Bryophyte, Gymnosperms and Fossil Plants

<b>Semester III</b>	<b>Anatomy of Angiosperms</b>	1.The objective of this course is to expose the students on the structural and anatomical organisations of plant tissues and their development
<b>Semester III</b>	<b>Economic Botany</b>	1. The objective of this course is to expose the students on the structural and anatomical organisations of plant tissues and their development

Programme	Course Name	Course Outcome
	<b>Genetics</b>	
Semester IV	<b>Molecular Biology</b>  <b>Plant Ecology &amp;</b>  <b>Phytogeography</b> <b>Plant Systematics</b>	<p>1. The objective of this course is to expose the students to Biological Macromolecules and various processes involved with these macromolecules</p> <p>1. The objective of this course is to expose the students to the process and mechanisms of plant reproduction</p> <p>1. The objective of this course is to expose the students to interaction of plant with its surroundings and also the geographic distribution of different plants</p>



<b>Semester V</b>	<b>Reproductive Biology of Angiosperms</b>  <b>Plant Physiology</b>	<p>1.The objective of this course is to expose the students to the process and mechanisms of plant reproduction</p> <p>1. The objective of this course is to expose the students to different physiological processes in plant life</p>
<b>Semester VI</b>	<b>Plant Metabolism</b>  <b>Plant Biotechnology</b>	<p>1. The objective of this course is to expose the students to various metabolic processes involved with plant life</p> <p>2. The objective of this course is to expose the students to application of modern tools and techniques in Biology</p>

<b>Programme+ Semester</b>	<b>Course Name</b>	<b>Course Outcome</b>
<b>B.Sc. (HON.) Chemistry</b>  <b>Semester I</b>	<b>C-101 Inorganic Chemistry</b>	<p>1. Sign of wave function, counter boundary and probability diagrams etc.</p> <p>2. Variations of orbital energy with atomic number.</p> <p>3. Properties of elements, atomic radii, ionic radii, size effect of ionic bond, solvation energy, covalent character of ionic bond, redox equations, principle involved in volumetric analysis etc.</p>

	<b>C-102 (Physical Chemistry)</b>	<ol style="list-style-type: none"> <li>1. Kinetic molecular model of a gas, behaviour of real gases etc</li> <li>2. Effect of addition of various solute on surface tension and viscosity. Cleansing action of detergents.</li> </ol>
<b>Semester II</b>	<b>C-201 Organic Chemistry</b>	<ol style="list-style-type: none"> <li>1. Knowledge of basic organic chemistry, definition, classification of stereoisomerism, optical activity, absolute and relative configuration etc.</li> <li>2. Knowledge of elimination reaction, electrophilic and nucleophilic addition</li> </ol>
	<b>C-202 (Physical Chemistry)</b>	<ol style="list-style-type: none"> <li>1. The application of mathematical tools to calculate thermodynamic properties</li> <li>2. The concept of free energy change and spontaneity.</li> </ol>
<b>Semester III</b>	<b>C-301 (Inorganic Chemistry)</b>	<ol style="list-style-type: none"> <li>1. Predict the purification of metal, study of compounds with emphasis on structure, bonding, preparation and properties.</li> <li>2. Real world applications, shapes etc of noble gas.</li> </ol>
	<b>C-302 Organic Chemistry</b>	<ol style="list-style-type: none"> <li>1. The prediction of mechanism for organic reactions</li> <li>2. How to design synthesis of organic molecule.</li> <li>3. The reactivity and stability of organic molecule based on structure.</li> </ol>
	<b>C-303 Physical Chemistry</b>	<ol style="list-style-type: none"> <li>1. Types of catalysis, Michaelis – Menten mechanism,</li> </ol>

		<p>mechanism of catalysed reaction at solid state.</p> <p>2. Steady - state approximation in reaction mechanism</p>
<b>Semester IV</b>	<b>C-401 Inorganic Chemistry</b>	<p>1. Predicting metal ion present in biological systems</p> <p>2. Use of chelating agents in medicine</p>
	<b>C- 402 Organic Chemistry</b>	<p>1.Reaction for preparation of Heterocyclic compounds, polynuclear hydrocarbons</p> <p>2.Reaction and mechanism of substitution in heterocyclic compounds</p>
	<b>C-403 Physical Chemistry</b>	<p>1.Quantitative aspects of Faraday's laws of electrolysis</p> <p>2.Application of conductance measurement</p>
<b>Semester V</b>	<b>C-501 (Organic Chemistry)</b>	<p>1.The chemical basis for biological phenomena and cellular structure.</p> <p>2. The chemical properties of amino acids co factors and sugar</p>
	<b>C-502 (Physical Chemistry)</b>	<p>1. difference between classical and quantum mechanics</p> <p>2. Qualitative treatment of hydrogen atom and hydrogen like ions.</p>
<b>Semester VI</b>	<b>C-601 (Inorganic Chemistry)</b>	<p>1 Basic principles involved in analysis of anions, cations solubility product , common ion effect etc</p> <p>2 Inorganic reaction mechanism</p> <p>3. Use of Wilkinson's catalyst in industrial process of hydrozenation of alkene, gas synthesis by metel carbonyl</p>
	<b>C-602 (Organic Chemistry)</b>	<p>1.Application of UV, IR, NMR spectroscopy, mass spectra in organic molecules.</p> <p>2. Biological importance of carbohydrates.</p>
<b>B.Sc. (HON.) Mathematics</b>	<b>C1.1 Calculus</b>	<p>1.Apply Calculus in real life problems</p> <p>2. Formulate mathematical models</p>
	<b>C1.2 Algebra</b>	<p>1.Describe various algebraic structures on sets</p> <p>2. Identify the algebraic structures present in different branches</p>

<b>Semester I</b>		of Sciences
<b>Semester II</b>	<b>C2.1 Real Analysis</b>	<ol style="list-style-type: none"> <li>1. Identify the properties of the number system.</li> <li>2. Describe various analytical properties of the real number system.</li> </ol>
	<b>C2.2 Differential Equations</b>	<ol style="list-style-type: none"> <li>1. Use the techniques to solve differential equations.</li> <li>2. Apply these techniques in various mathematical models used in real life problems.</li> </ol>
<b>Semester III</b>	<b>C3.1 Theory of Real Functions</b>	<ol style="list-style-type: none"> <li>1. Discuss limit, continuity and differentiability of real valued functions</li> <li>2. Expand functions in series and different form of remainders</li> </ol>
	<b>C3.2 Group Theory I</b>	<ol style="list-style-type: none"> <li>1. Describe various group structures on sets.</li> <li>2. Identify the group structures present in different branches of sciences.</li> </ol>
	<b>C3.3 PDE and Systems of ODE</b>	<ol style="list-style-type: none"> <li>1. make mathematical formulations and their solutions of various physical problems;</li> <li>2. design mathematical models used in heat, wave</li> </ol>
<b>Semester IV</b>	<b>C4.1 Numerical Methods</b>	<ol style="list-style-type: none"> <li>1. Discuss various numerical methods and interpolation formulae</li> <li>2. Apply numerical techniques for solving differential equation</li> </ol>
	<b>C4.2 Riemann Integration and Series of Functions</b>	<ol style="list-style-type: none"> <li>1. Riemann integration, improper integrals</li> <li>2. Differentiation and integration of powerseries</li> </ol>
	<b>C4.3 Ring Theory and Linear Algebra I</b>	<ol style="list-style-type: none"> <li>1. Describe various ring structures on sets.</li> <li>2. Solve the system of linear equations</li> </ol>
<b>Semester V</b>	<b>C5.1 Multivariate Calculus</b>	<ol style="list-style-type: none"> <li>1. Extend the concepts from one variable calculus to function of several variables</li> <li>2. Demonstrate the ability to think critically and solving</li> </ol>

		application of real world problems involving double/ triple integrals.
	<b>C5.2 Group Theory II</b>	1. Apply results from preliminary concepts to solve contemporary problems.
<b>Semester VI</b>	<b>C6.1 Metric Spaces and Complex Analysis</b>	1.various properties of metrics paces 2. complex number system, its differentiation and integration.
	<b>C6.2 Ring Theory and Linear Algebra II</b>	1.Apply theorems proof/ solution techniques to solve real world problems.
<b>B..Sc Physics Semester I</b>	<b>PHYSICS-C-I MATHEMATICAL PHYSICS – I</b>	1.Develop the requisite mathematical skills of a student to understand the fundamental topics in Physics. 2.Develop the ability of a student to critically analyze a topic. 3.Prepare a student for more advanced topics in Physics by providing a solid grip over the fundamental concepts in Physics.
<b>Semester I</b>	<b>PHYSICS-C-II MECHANICS</b>	1. Develop knowledge of special relativity to understand relativistic formulation of modern theories. 2. Develop knowledge of mechanics which will help students in their everyday life.
<b>Semester II</b>	<b>PHYSICS-C-III ELECTRICITY AND MAGNETISM</b>	1. Gain basic knowledge of electricity and magnetism. 2. Understand the electrical and magnetic properties of matter in brief. 3.Understand the effect of electric field on magnetic field and the effect of magnetic field on current.
<b>Semester II</b>	<b>PHYSICS-C-IV WAVES AND OPTICS</b>	1.Enable the students to analyze different phenomena due to the

		<p>interaction of light with light and matter.</p> <p>2. Train the students to use different optical instruments</p>
<b>Semester III</b>	<b>PHYSICS-C-V MATHEMATICAL PHYSICS – II</b>	<p>1. Develop the requisite mathematical skills to understand some of the fundamental topics (slightly more advanced than those in Mathematical Physics I) in Physics.</p> <p>2. Develop the ability of a student to critically analyze a topic.</p> <p>3. Prepare a student for more advanced topics in Physics by providing a solid grip over the fundamental concepts in Physics.</p>
	<b>PHYSICS-C-VI THERMAL PHYSICS</b>	<p>1. Apply the laws of thermodynamics in real world problems.</p> <p>2. Conduct scientific problems and experiments on thermodynamics and allied disciplines.</p>
	<b>PHYSICS-C-VII DIGITAL SYSTEMS AND APPLICATIONS</b>	<p>1. Identify and understand digital electronic principles and systems.</p> <p>2. Apply the knowledge to analyze and apply digital circuits in solving circuit level problems</p>
<b>Semester IV</b>	<b>PHYSICS-C-VIII MATHEMATICAL PHYSICS-III</b>	<p>1. Understand the theoretical basis for the understanding of quantum Physics as the basis for dealing with microscopic phenomena.</p> <p>2. Apply concepts of 20<sup>th</sup> Century Modern Physics to deduce the structure of atoms</p>
	<b>PHYSICS-C-IX ELEMENTS OF MODERN PHYSICS</b>	<p>1. Understand and appreciate the theory of modern physics</p> <p>2. Develop the ability to apply it in solving simple problems in Quantum Mechanics (QM), structure of atoms, Laser, and Nuclear Physics.</p>
	<b>PHYSICS-C-X ANALOG SYSTEMS AND APPLICATIONS</b>	<p>1. Learn the foundation knowledge of analog electronic systems.</p> <p>2. Learn the working and applications of PN junction and</p>

		<p>bipolar junction transistors (BJT).</p> <p>3. Learn to analyze circuits containing PN junction and BJT along with the application of BJTs as amplifiers and oscillators.</p>
<b>Semester V</b>	<b>PHYSICS-C-XI QUANTUM MECHANICS AND APPLICATIONS</b>	1. Learn how to apply quantum mechanics to solve physical systems in different areas of science
	<b>PHYSICS-C-XII SOLID STATE PHYSICS</b>	<p>1. Equip a student with basic concepts of solid state Physics so that the knowledge can be applied for further development of the subject.</p> <p>2. Enable a student to work in both theoretical and experimental aspects of solid state Physics.</p>
<b>Semester VI</b>	<b>PHYSICS-C-XIII ELECTROMAGNETIC THEORY</b>	<p>1. Solve problems relevant to interfaces between media with defined boundary conditions.</p> <p>2. Use Maxwell's equations to describe the behaviour of electromagnetic waves in vacuum as well as medium.</p>
	<b>PHYSICS-C-XIV STATISTICAL MECHANICS</b>	<p>1. Equip the students with basic knowledge of the Statistical Mechanics and hence will be able to look critically for analyzing any physical phenomena.</p> <p>2. Create interest to the subject to pursue further higher study in future.</p>
<b>Zoology</b>	<b>ZC101T NON-CHORDATES I: PROTISTS TO PSEUDOCOELOMATES</b>	1. It will expose the students to various forms of protozoa and worms; their classification and structural anatomy

<b>Semester I</b>	<b>ZC102 PRINCIPLES OF ECOLOGY</b>	1.It will familiarize the students with fundamentals of ecology and impacts of ecological factors on living organisms
<b>Semester II</b>	<b>ZC203T NON-CHORDATES II: COELOMATES</b>	1.It will expose the students to various forms of coelomates, their classification and structural anatomy
	<b>ZC204T CORE COURSE IV CELL BIOLOGY</b>	1.It will expose the students to structure and function of a cell as the fundamental unit of life
<b>Semester III</b>	<b>ZC305T CORE COURSE V: DIVERSITY OF CHORDATA</b>	1.It will expose the students to various forms of chordates, their classification and structural anatomy.
	<b>ZC306T CORE COURSE VI: ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS</b>	1.It will provide a foundation for understanding the complexities of the coordination system of animal body.
	<b>ZC307T CORE COURSE VII: FUNDAMENTALS OF BIOCHEMISTRY</b>	1. It will expose the students to biomolecules of living organisms, their interactions for perpetuation of life.
<b>Semester IV</b>	<b>ZC408T CORE COURSE VIII: COMPARATIVE ANATOMY OF VERTEBRATES</b>	1.It will expose the students to structure and function of a cell as the fundamental unit of life
	<b>ZC409T CORE COURSE IX:</b>	1.It will provide a foundation for understanding the



	<b>ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS</b>	complexities of the coordination system of animal body.
	<b>ZC410T BIOCHEMISTRY OF METABOLIC PROCESSES</b>	1 It will familiarize the students with metabolic process of living organisms
<b>Semester V</b>	<b>ZC511T CORE COURSE XI: MOLECULAR BIOLOGY</b>	1.It will familiarize the students with molecular biology
	<b>ZC512T CORE COURSE XII: PRINCIPLES OF GENETICS</b>	1.It will provide a foundation for understanding the complexities of the Genetics of animal body.
<b>Semester VI</b>	<b>ZC613T CORE COURSE XIII: DEVELOPMENTAL BIOLOGY</b>	1.It will provide a foundation for understanding the complexities of the coordination system of animal body.
	<b>ZC614T CORE COURSE XIV: EVOLUTIONARY BIOLOGY</b>	1.It will provide a foundation for understanding the Evolution of animal body.

#### **COURSE OUTCOMES OF POST GRADUATE SECTION**

<b>PROGRAMME</b>	<b>SEMESTER</b>	<b>Programme Details</b>		<b>Course Outcome (CO)</b>
		<b>COURSE CODE</b>	<b>TITLE</b>	
	1 <sup>st</sup> sem	MBY202C101	a). Phycology, Mycology &	a). To acquire knowledge on the structure,

<b>M.Sc. IN BOTANY</b>	Core Course (Theory)	b). MBY202C102 c). MBY202C103 d). i.MBY2021E11/ ii.MBY2021E12	Lichenology	reproduction and life cycle of algae from lower form to advance groups. To study the classification, structure and reproductive features of fungi and lichens. <b>b)</b> <input type="checkbox"/> To acquire knowledge on the characters, structure and reproduction of Bryophytes. <input type="checkbox"/> To acquire knowledge on living and fossil forms of Pteridophytes. <input type="checkbox"/> To study types, structure, distribution and role of mycorrhiza. c). <input type="checkbox"/> This paper provides an understanding of basic techniques for plant tissue culturing process. <input type="checkbox"/> To acquire the knowledge of gene transfer techniques in plant. d) i. <input type="checkbox"/> To acquire knowledge on Structure, organization, function, interrelationships of cell membrane and cell organelles and cell communication systems. <input type="checkbox"/> To study on different types of cell transport system, language transcription and translation ii. <input type="checkbox"/> To understand the structure, biology, nutrition and reproduction of bacteria used as bio fertilizers. <input type="checkbox"/> To give information on pathogen causing diseases in plants and then cultivation process and uses of edible and non-edible mushrooms e). <input type="checkbox"/> To observe the structure of Algae, Fungi, Bryophytes, Pteridophytes, Lichens and mycorrhiza. <input type="checkbox"/> Sectioning, side preparation and observation. f). To find out the cell structure and cell
	Practical	e). MBY202C114 f). MBY202C115	b). Bryology, Pterology & Mycorrhiza c). Plant Tissue Culture & Genetic Engineering d). i. Cell & Molecular Biology ii. Biofertilizers & Mushroom Cultivation  Lab-I  Lab-II	

				organelles and Molecular Biology Techniques. This course is planned to give hands on training on genetic engineering tools
<b>M.Sc. IN BOTANY</b>	2 <sup>nd</sup> sem Core Course (Theory)          Practical	MBY202C201 b). MBY202C202 c). MBY202C203 d). i. MBY2021E21/ ii. MBY2021E22  e). MBY202C214 f). MBY202C215	a). Gymnosperms & Systematic Botany b). Anatomy & Embryology of Angiosperms c). Plant Physiology  Plant Breeding & Horticulture ii.Orchidology  Lab-III Lab-IV	a). To acquire knowledge on the structure, reproduction and life cycle of different types of gymnosperms from lower form to advance groups. To study the basics of plant taxonomy such as description, identification, nomenclature and important classification. b). To acquire knowledge about tissue structure, function and various anatomical features of plants. To understand the growth and development of embryo. c). To understand the physic-chemical organization and functional aspects of plants. d).i. To study the progress made in the field of Horticulture and Plant Breeding. To understand the principle and to study the basic techniques in Horticulture & Plant Breeding. ii. To study the principle and practices of orchid biology cultivation, conservation and culture. To provide students with broad perspective and greater appreciation for orchids as well as elucidate their potential and value as a commercial ornamental crop. To understand the principle and to study the

				<p>basic techniques in orchid cultivation and commercialization.</p> <p>e). □ To observe the morphological study of vegetative and reproductive structure of Gymnosperms and Angiosperms. □ Sectioning, slide preparation and observation.</p> <p>f). To study the physiological aspects of Angiospermic plants.</p> <p>This course is planned to give hands on training on Horticulture, Plant Breeding and Orchids.</p>
<b>M.Sc. IN BOTANY</b>	<p>3<sup>rd</sup> sem Core Course (Theory)</p> <p>Practical</p>	<p>MBY202C301</p> <p>b). MBY202C302</p> <p>c). MBY202C303</p> <p>d). MBY202C304</p> <p>e). MBY202C315</p> <p>f). MBY202C316</p>	<p>a). Ecology, Energy, Environment &amp; Bioinformatics</p> <p>b). Morphology, Taxonomy of Angiosperms &amp; Economic Botany</p> <p>c). Plant Biotechnology</p> <p>d). Microbiology and Plant Pathology</p> <p>Lab-V</p>	<p>a). To understand the sustainability of living system in different ecosystem To study different types renewable energy sources for environmental management To understand basic knowledge about the bioinformatics.</p> <p>b). To understand the morphological characters of flowering plants in the plant kingdom. To acquire the knowledge of taxonomy of important angiospermic plants. To study about the economic importance of flowering plants.</p> <p>c). To know basics of biotechnology and its applications in plant system To understand the different techniques, products derived from plants using modern</p>

			Lab-VI	<p>biotechnology.</p> <p>d). This course will introduce the student to the world of microbes (bacteria, virus and fungi), which are there in every possible place.</p> <p>The principles of Plant Pathology also included to know different types of plant disease Symptoms and it control measure.</p> <p>e). □ To study Ecosystem, Energy crisis and management the Environment.</p> <p>To study the angiosperm morphology both vegetative and reproductive structures.</p> <p>To identify the angiospermic plants and its use.</p> <p>f). To know techniques of molecular biology and applications biotechnology.</p>
<b>M.Sc. IN BOTANY</b>	4 <sup>th</sup> sem	BY202421	Dissertation	To do basic research in the field of biological sciences

PROGRAMME	SEMESTER	Programme Details		Course Outcome (CO)
		COURSE CODE	TITLE	
<b>M. Sc. In</b>	1 <sup>st</sup> sem Core Course (Theory)	<b>MZY182101</b>	1. Cell Biology	<b>1. a)</b> To acquire knowledge on the structure and both internal and external of the cell. <b>1. b)</b> To acquire knowledge about the cell cycle and cell division along with the
	<b>2. MZY182102</b>	2. Developmental Biology		

<p><b>Zoology</b></p>	<p>Practical</p>	<p><b>3. MZY182103</b> <b>4. MZY182104</b></p> <p><b>5). Lab 1</b> <b>6. Lab II</b> <b>7. Lab III</b></p>	<p>3. Animal Physiology and Endocrinology</p> <p>4. Ecology and Wildlife</p> <p>5. Cell Biology</p> <p>6. Physiology and Endocrinology</p> <p>7. Ecology and Wildlife</p>	<p>behaviour of the cell.</p> <p><b>2. a)</b> To acquire knowledge on the sexual reproduction in human being. <b>2. b)</b> To acquire knowledge on the development of foetus in Human being and Insects. <b>2. c)</b> To acquire knowledge on the cell interaction in organism and development in embryo. <b>2. d)</b> To acquire knowledge on the interaction on organisms and the development of glands in mammals. <b>2. e)</b> To study the formation of organs and importance of stem cell.</p> <p><b>3. a)</b> To acquire knowledge on different life process such as respiration, circulation, excretion. <b>3. b)</b> To acquire knowledge on importance of temperature nervous system in human being. <b>3. c)</b> To acquire knowledge on the endocrine system and activities of different hormones and different body processes.</p> <p><b>4. a)</b> To acquire knowledge on both biotic and abiotic components of nature and their relationship. <b>4. b)</b> To study relationship between animals and their surrounding environment. <b>4. c)</b> To study the interaction among biotic components and fundamental concept of</p>
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				<p>ecology.</p> <p><b>4. d)</b> To study the population of an area.</p> <p><b>4. e)</b> To study the different wildlife animal of an area giving importance to North-east India especially Assam.</p> <p><b>4. f)</b> Adopting different strategies for management and conservation of animals in their natural environment, such as project Tiger.</p> <p><b>4. g)</b> To study different aspect of pollution and their control measures.</p> <p><b>Lab 1.</b> To study different group of cell found in body along with preparation and study of histological slides from tissue such as liver, lungs, intestine, etc.</p> <p><b>Lab 2.</b> To study the endocrine gland of invertebrates along with count and estimation of RBC and WBC.</p> <p><b>Lab 3.</b> To study dissolve oxygen and free Carbon dioxide along with different parameters of water.</p>
<b>M. Sc. In Zoology</b>	2 <sup>nd</sup> sem Core Course (Theory)	<p><b>1.</b> <b>MZY182201</b></p> <p><b>2.</b> <b>MZY182202</b></p> <p><b>3.</b> <b>MZY182203</b></p> <p><b>4.</b></p>	<p>1. Animal Taxonomy</p> <p>2. Genetics</p> <p>3. Immunology</p> <p>4. Microbiology and Biotechnology</p>	<p><b>1. a)</b> To study the different taxonomy and classification system of both animal and plant kingdom.</p> <p><b>1. b)</b> Classification system and procedure and also naming system</p> <p><b>1. c)</b> To study about biodiversity, its conservation and special preference in NE region for conservation strategies.</p> <p><b>1. d)</b> Study of diversity with special aspect upon species ecology.</p>

	Practical	<b>MZY182204</b>  <b>Lab 1</b> <b>MZY182213</b>  <b>Lab 2</b> <b>MZY182212</b>  <b>Lab 3</b> <b>MZY182214</b>	Lab 1 Immunology  Lab 2 Genetics  Lab 3 Microbiology and Biotechnology	<p><b>2. a)</b> To study the inheritance of character in human being and linkage and crossing over.</p> <p><b>2. b)</b> To acquire knowledge on sex determination in human being and insect. Also study about Human Genome Project.</p> <p><b>2. c)</b> To study about Genetic disease both in human being, crop and livestock.</p> <p><b>2. d)</b> To acquire knowledge on genetic makeup of human being and also detail study of transgenic animals and their importance in human welfare.</p> <p><b>3. a)</b> To acquire knowledge about cell tissue related to immune system along with maturation of B and T lymphocytes.</p> <p><b>3. b)</b> To acquire knowledge about cellular activities along with immune response of body.</p> <p><b>3. c)</b> To study different infectious disease and response of immunity related to the disease.</p> <p><b>4. a)</b> To acquire knowledge on microbial diversity and biological technique used for their study.</p> <p><b>4. b)</b> To acquire knowledge about different immune disease and their histopathological test related to detection of the diseases.</p> <p><b>4. c)</b> To study about different biological biodiversity and Patents along with biosafety processes.</p> <p><b>4. d)</b> To acquire knowledge about sericulture</p>
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				<p>techniques and also treatment of different diseases.</p> <p><b>Lab 1.</b> To study about the different components of blood and immune system along with preparation of permanent slide.</p> <p><b>Lab 2.</b> To study about the inner content of cell nucleus and genetic material, also study about different blood grouping system in human being.</p> <p><b>Lab 3.</b> To study about the different techniques used in microbiology lab along with study of Rh factor and antibody-antigen reaction.</p>
<b>M. Sc. In Zoology</b>	<p>3<sup>rd</sup> sem Core Course (Theory)</p> <p>Practical</p>	<p><b>MZY182301</b></p> <p><b>MZY182302</b></p> <p><b>3. MZY182303</b></p> <p><b>4. MZY182304</b></p> <p><b>Lab 1</b> <b>MZY182311</b></p> <p><b>Lab 2</b> <b>MZY182312</b></p>	<p>1. Parasitology and Toxicology</p> <p>2. Economic Zoology</p> <p>3. Animal Behaviour</p> <p>4. Environmental Biology</p> <p>Lab 1 Parasitology and Toxicology Lab</p> <p>Lab 2 Economic Zoology and Animal Behaviour Lab</p>	<p><b>1. a)</b> To acquire knowledge on the sources and classification of parasite.</p> <p><b>1. b)</b> To acquire knowledge on the basic concepts of toxicology of organisms.</p> <p><b>1. c)</b> To acquire knowledge on the different types of pollution and their control methods.</p> <p><b>1. d)</b> To acquire the poisons on organism and their control methods.</p> <p><b>2. a)</b> To acquire knowledge on the different methods of pest control and damage caused by pest.</p> <p><b>2. b)</b> To acquire knowledge on the fish technology.</p> <p><b>2. c)</b> To acquire knowledge on sustainable agriculture and about silkworms and honeybee.</p>

		<b>3</b>	<p>Lab 3 Environmental Biology</p>	<p><b>2. d)</b> To acquire the knowledge on the principle and management of poultry farms.  <b>3. a)</b> To study the different behaviours of animals.  <b>3. b)</b> To study the different types of reflexes, orientation and communication in animals.  <b>3. c)</b> To acquire knowledge on different selection of animals.  <b>3. d)</b> To acquire the knowledge on nervous and hormonal regulation in animals and their behaviour.  <b>3. e)</b> To study of social behaviour of insect and different behaviours and characteristics of different animals.  <b>4. a)</b> To acquire knowledge on the causes and effect of climate change.  <b>4. b)</b> To study about different types of waste, their sources, characteristics, disposal and management.  <b>4. c)</b> To acquire knowledge about human population and its effect on environment.  <b>4. d)</b> To acquire knowledge on different types of disease.  <b>4. e)</b> To study about causes and effect of urbanisation.</p> <p><b>Lab 1</b> To acquire knowledge on the sources and classification of parasite and also the basic concepts of toxicology of organisms.  <b>Lab 2</b> To acquire knowledge on the different methods of pest control and damage caused by pest and wild life sanctuary park etc.</p>
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<b>M. Sc. In Zoology</b>	4 <sup>th</sup> sem Core Course (Theory)	<b>ZY182401</b> <b>ZY182402</b>	1. Tools and Techniques, Biostatistics and Bioinformatics  2. Histology and Histochemistry  <b>Lab 1</b> Tools and Techniques, Biostatistics and Bioinformatics lab <b>Lab 2</b> Histology and Histochemistry lab <b>Lab 3</b> Project	1. To study the branch of statistics that collecting and deals with data relating to living organism using biostatistics and bioinformatics tools.  2. The study of branch of science concerned with the identification and distribution of the chemical constituent and microscopic structure of tissues. <b>Elective</b> a) To study and learn about different techniques and methods of culturing and harvesting fish in different water types. b) To study and learn about different techniques and methods for cultivation of plants such as vegetables in farms using water as sole growth medium.  <b>Lab 1</b> To study the test of estimation of protein and also learn how to use the different tools of Biostatistics and Bioinformatics. <b>Lab 2</b> To study about preparation of different slides of tissue of liver, kidney etc and also study of permanent slide of different tissue of body. Also study about blood and bone marrow cell. <b>Lab 3 Project</b> To study and learn about different techniques of practical knowledge about Biostatistics,
	Practical	<b>Lab 1</b> <b>ZY182411</b> <b>Lab 2</b> <b>ZY182412</b> <b>Lab 3</b> <b>ZY182423</b>  <b>Elective</b> <b>ZY1824E01</b>		

				Bioinformatics and Histology.
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