

Namrup College PO-Parbatpur-786623 Dist. Dibrugarh, Assam

Programme outcome, Programme Specific Outcome & Course Outcome.

<u>Assamese</u>

Program Outcome:

Under graduate course in Assamese major deals with linguistics and the History of Assamese Literature. It incorporates Assamese literature from 9th to the 21st century. It includes Indian, Western literature and Cultural History. Through the whole subject material students can come to know about tourism, archaeology, agriculture, fashion, indigenous dress and ornaments, sports, instruments, social & economic status, human relationship, religious and historical sentiments etc of different periods in Assam.

Programme Specific Outcome:

After completion of this course students can gain information and sense of the Assamese literature, culture, tradition and language. The course provide skills in creative writing, proof reading, competence in language, analytical views etc. It will help students in empowering themselves with communication skill and creative writing skills.

Course Outcome:

After passing out with major in Assamese, students can opt for post graduate in literature, Linguistic, cultural studies, Mass communication, Tourism etc. They can engage themselves in research activities and also in teaching profession.

<u>Botany</u>

Program outcome:

Under graduate course in Botany major deals with Lower and vascular cryptograms, plant pathology, Gymnosperm, Palaeobotany, Microbiology and Biotechnology, Plant Taxonomy, Cell Biology, Anatomy and Reproduction in Angiosperm, Genetics, Plant Breeding, Biostatistics, Plant Physiology, Plant Ecology, Functional and Chemical biology, Molecular Biology and Immunology, Biophysics and Bioinformatics and Utilization of plants . This course provide basic and fundamental knowledge of thallus, morphology, reproduction and evolution of lower and upper cryptograms, angiosperm and plant pathology. It also provides the knowledge of microbiology, biotechnology, molecular biology in the light of recent developments. Course on angiosperm taxonomy provide the knowledge of morphology and classification of various taxa. In addition this course also provides knowledge on structural and functional aspect of cell and cell organelles; introduce application of genetic for crop improvement, statistics and chemical and physiological aspects of plant. It also incorporates the tools and techniques of physical and computer sciences in biological study and utilization of plant resources for human welfare.

Program Specific outcome:

After completion of this course, students will gain basic and fundamental knowledge on molecular biology, biophysics, bioinformatics, biochemistry, genetics, microbiology, plant immunology, morphology, reproduction and evolution of angiosperm, lower and upper cryptograms and plant pathology. Students getting graduation will be able explained about the subject matter and apply in various field of plant sciences.

Course outcome:

After graduation with major in Botany, students can opt for post graduate in Life Sciences, Environmental Ecology, Bioinformatics, Biotechnology, Biochemistry, Plant Pathology, Microbiology, etc. This course equips students for various fields like research, teaching, competitive examinations, jobs in various sectors, etc.

Chemistry

Program Outcome:

Chemistry is a vast subject which is involved in every sphere of life. A chemist can synthesize, characterize, and analyse the compounds. By teaching physical chemistry, we try to make students understand the principles on which the subject is based on. By teaching inorganic chemistry, we try to make them understand about elements, reactions related to metals and non-metals, coordination chemistry etc. Organic chemistry is about natural products, carbohydrates, pesticides etc. All the concepts we are teaching have practical application and are industrially relevant.

Program Specific Outcome:

The course familiarized the students with different fields of specialization like Inorganic, Organic, Physical, Quantum chemistry & Spectroscopy.

The major course consists of fourteen theory paper giving ideas of different field of chemistry to the students.

The inorganic chemistry papers provide the knowledge to the students about the characteristics of various elements and compounds. These specific papers includes co-ordination compounds, metallurgy, Inorganic material chemistry, non-metals, bio-inorganics, metal clusters and polymers etc.

The organic chemistry papers gives knowledge of different types of organic reactions, hydrocarbons, biochemistry, pesticides, dyes and pharmaceutical compounds.

The physical chemistry papers provide the knowledge of principles of chemistry and physical forces which govern our surroundings and also provide knowledge about thermodynamics, electrochemistry, chemical kinetics ,photochemical processes and catalysis.

Spectroscopy paper highlight the concept of principles and applications of different analytical tools like UV/Vissibls, NMR, IR, ESR spectroscopy etc.

Course Outcome:

On successful completion of the course, the Dibrugarh University awards the students the degree of Bachelor of Science. The students on graduating with majors in chemistry, the scopes are many. They can for example, pursue higher education like M.Sc in Chemistry, MBA or B.Ed and whatever they like. Just after B.Sc also they can take up multiple job opportunities. We have many industries nearby Namrup like, Assam Petrochemicals Ltd, Brahmaputra Valley Fertilizer

Corporation Ltd, Oil India Ltd, Assam Gas Company Ltd. All these companies require chemists and operators who have graduate degree. Moreover we also have ONGCL and BRPL who hire our graduates. We have many students working in these companies.

We also have many students who have after graduating in B.Sc have pursued M.Sc in universities like Dibrugarh University, Tezpur University, NIT Silchar, Assam University Silchar, Kaziranga University, Tripura University etc and engaged in different Oil and Drug industries. Many students have taken up teaching and have become very successful and sincere teachers.

Computer Science

Program Outcome:

The 3 years undergraduate programmed in computer science (pass course) supports the students in basic understanding on the computer system. The course explores the basic needs, its uses and how the processes of works inside the computer system, its designed, built and operate. The course also concerned with programming language, coding and its implementation in various applications. The course develops the technical knowledge and skills as well as learning about the concepts and theories with practical behind networking.

Program specific outcome:

Good problem-solving skill, diverse software and platform development requirement, DNS, HTTP, Wifi security, protocol verification, Artificial intelligence, Cloud computing, Transmission of digital data, network security, backup and recovery of data. Students are also earns the ability to access data efficiently from a large database system.

Course outcome:

The course is a futuristic course, it draw up the students for future higher studies in computer science and Information technology. It helps out the student in various avenues like Research works, teaching, software developer, Web developer, Video game developer, System architect, Information security analyst, Cyber security analyst, Mobile App developer, etc..

Economics

Program Outcome:

B.A. Course in Economics consists of 14 papers in Major with a total of 1400 marks. Each paper will carry 100 marks of which 20 marks will be earmarked for internal assessments –

- 1. Micro Economics I
- 2. Macro Economics
- 3. Micro Economics II
- 4. Statistical Methods in Economics
- 5. Mathematics for Economics
- 6. Public Economics Theoretical issue
- 7. Development Economics with Indian Perspective I
- 8. Public Economics- policy issue
- 9. History of Economic Thought
- 10. Monetary Theories and Financial Markets
- 11. Development Economics with Indian Perspectives II
- 12. Environmental Economics
- 13. Internal Economics
- 14. Economic issues of Assam

Program Specific outcome:

The course would enable the learners to take cognizance of the real economic phenomena. After going through this course the learners are to develop the understanding of the real economic situation. The learners would also be able to analyze the behavioral pattern of different Economic agents and to deal with the advanced theoretical issues and their practical applications of the business environment.

Course Outcome:

The course had been developed to prepare students for carrier as professionals, academicians or researchers in the field of Economics. The student can go for higher studies like M.A. in Economics, MBA, and Business Economics. The students can opt Economics an optional subject in various – competitive Examination i.e. Civil Service, Indian Economic

Service etc. Moreover this course further enables the learners to prepare for Banking Sector and also on the basis of the knowledge of this course the learners can start own business Enterprises.

Education

Program Outcome:

The Under-Graduate program in Education Major helps the students to understand the meaning of education and its role and function. The Major Course explains the concepts of Indian and Western Schools of Philosophy and their impact on education. The course helps students to understand the meaning of different aspects of psychological, sociological and technological foundations of education. The course explains the theories of intelligence, personality, learning, application of statistics, measurement and evaluation in education. It also discusses the contributions of great educators around the world. The course explains the emerging trends of the Indian Education system and the recommendations of the different Education Commissions. Students also get an opportunity to understand the educational system of the country and a few other countries in the world. Field study and psychological practical are also included in the course.

Program Specific Outcome:

Micro-teaching, preparing lesson plans, practice teaching in schools which are the integral part of the Major syllabus. It enhances knowledge on teaching skills and familiarizes the students about teaching different subjects.

Course Outcome:

The course equips students for higher studies in Education. It equips students for jobs in teaching at the different levels of Education and others.

ENGLISH

Program Outcome:

The undergraduate programme in English Major deals with English Literature and Language. The programme acquaints the students with the history of English Literature - its

different ages, major literary works such as poetry, drama, novel, non-fictional prose etc. It also includes mythology, literary theory and criticism, linguistics and philosophical writings. Further the programme apprises the students with the major texts of English literature from different non-English speaking countries.

Program Specific Outcome:

The course familiarizes the students with the history and growth of English Literature from its inception in the Anglo-Saxon period to the present time. It enables them to apply critical frameworks to analyse linguistic, cultural and historical background of texts written in English and also makes them sensitive and aware of social issues. It also engages the students with the history and growth of English Language and the theories and concepts related to this branch.

Course Outcome:

The course enables the students to comprehend the socio-cultural background of British and other European literature, American Literature, Indian Writing in English and other postcolonialwriting in English. The course facilitates the students with lot of career opportunities such as teaching profession, mass communication and journalism,tourism industry and so on. The students can also pursue higher studies in English Literature, Linguistics, Cultural Studies, Folklore, MBA, Mass Communication, Tourism, Law etc. Overall, the course makes the students conscious towards different socio- political and cultural issues and helps them to be responsible citizens.

Mathematics

Program Outcome:

The Under Graduate program in Mathematics Honours as well as non-honours deals with both discrete as well as computational mathematics covering different branches of the subject like Algebra, Geometry, Calculus and Statistics & Probability.

The Objectives of the B.Sc. Programme in Mathematics are listed in the following. After completing the programme the students will be able to-

- (1) Apply Mathematics as a tool to solve problems of other disciplines viz., Science and Technology, Commerce and Management, Humanities, Soft-computing etc.
- (2) Pursue higher studies in the subject to take part in the academic upliftment of the subject.

- (3) Develop new techniques/methods for solving the unsolved problems of the other disciplines.
- (4) Construct Mathematical models to mimic real life problems and make their predictions, estimations, and regression.

Program Specific Outcome:

A student should be able to familiar with basic facts about mathematic as well as able to display knowledge of conventions such as notations, terminology. The course familiarizes students with the subject. After going through the course the students will be able to apply Calculus in real life problems & formulate mathematical models, describe various algebraic structures on sets, also identify the algebraic structures present in different branches of Sciences. Also, a graduate student will develop the ability to read and learn mathematics on their own. Most specific thing is that a student will understand the historical and contemporary role of mathematics and be able to place the discipline properly in the context of other human intellectual achievement.

Course Outcome:

The course will enable students to acquire knowledge in both discrete as well as computational mathematics. As the course is a multi- disciplinary it will also help the students of other disciplines to know the subject well and also will provide lots of career opportunities. One learning the course can communicate mathematical ideas both orally and in writing. They can investigate and apply mathematical problems and solutions in a variety of contexts related to science, technology, business and industry and illustrate these solutions using symbolic, numeric or graphical methods.

Political Science

Programme Outcome:

Political Science Major course has a significant thrust on Western Political Thought, Indian Government Politics, Public Administration, International Relations, Comparative Politics, Politics of North East India, Political Theory, Indian Political Thought, Indian Foreign Policy, International Law, Human Rights, Women 's Studies, Rural Development and Indian Administration.

Programme Specific Outcome:

The courses familiarizes the students with deferent approaches to the study of politics and orients them on contemporary political problems issues and behaviour thus enabling them to formulate a general idea on the political phenomena. It also helps them to comprehend the basic process of government system.

Course Outcome:

The course prepares student for pursuing higher education in Political Science . Its orients students towards national and state level competitive examination like APSC, UPSC, etc. Many students also pursue courses in Law.

PHYSICS

Program Outcome:

B.Sc.(Honours) in Physics is intended to provide a broad framework to create an academic base that responds to the need of the students to understand the basics of Physics and its ever evolving nature of applications in explaining all the observed natural phenomenon as well as predicting the future applications to the new phenomenon with a global perspective. The curriculum framework is designed and formulated in order to acquire and maintain standards of achievement in terms of knowledge, understanding and skills in Physics and their applications to the natural phenomenon as well as the development of scientific attitudes and values appropriate for rational reasoning, critical thinking and developing skills for problem solving and initiating research which are competitive globally from quality point of view.

The aims and objectives of our UG educational programs in sciences in general and Physics in particular is structured to

create facilities and environment to enable students consolidate the knowledge acquired at +2 level and to motivate and inspire them to create deep interest in Physics, to develop broad and balanced knowledge and understanding of physical concepts, principles and theories of Physics.

- learn, design and perform experiments in laboratories to demonstrate the concepts, principles and theories learned in the classrooms.
- develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental Physics.
- expose the student to the vast scope of Physics as a theoretical and experimental science with applications in solving most of the problems in nature spanning from 10⁻¹⁵ m to 10²⁶m in space and 10⁻¹⁰eV to 10²⁵eV in energy dimensions.
- emphasize the discipline of Physics to be the most important branch of science for pursuing the interdisciplinary and multidisciplinary higher education and/or research in interdisciplinary and multidisciplinary areas.

Program Specific Outcomes in B.Sc. (Honours) Physics

The student graduating with the Degree B.Sc (Honours) Physics should be able to

✤ Acquire

(i) a fundamental and coherent understanding of the academic field of Physics, its different learning areas and applications in basic Physics like Material science, Nuclear and Particle Physics, Condensed matter Physics, Atomic and Molecular Physics, Mathematical Physics, Electricity & Electronics etc., and its linkages with related disciplinary areas/subjects like Chemistry, Mathematics, Life sciences, Environmental sciences, Atmospheric Physics, Computer science, Information Technology etc.

(ii) procedural knowledge that creates different types of professionals related to the subject area of Physics, including professionals engaged in research and development, teaching and government/public service etc.

(iii) skills in areas related to one's specialization area within the disciplinary/subject area of Physics and current and emerging developments in the field of Physics.

- Demonstrate the ability to use skills in Physics and its related areas of technology forformulating and tackling Physics-related problems and identifying and applying appropriatephysical principles and methodologies to solve a wide range of problems associated withPhysics.
- Recognize the importance of mathematical approaches to describing the physical world.
- Plan and execute Physics-related experiments or investigations, analyze and interpretdata/information collected using appropriate methods, including the use of

appropriatesoftware such as programming languages, and report accuratelythe findings of the experiments/investigations while relating the findings to relevant theories of Physics.

Demonstrate relevant generic skills and global competencies such as

(i) problem-solving skill

(ii) investigative skills,

(iii) communication skills

(iv) analytical skills

(v) ICT skills;

(vi) personal skills

✤ Demonstrate professional behaviour such as

(i) being objective, unbiased and truthful in all aspects of work and avoiding unethical, irrationalbehaviour such as fabricating, falsifying or misrepresenting data or committingplagiarism;

(ii) appreciation of intellectual property, environmental and sustainability issues; and

(iii) promoting safe learning and working environment.

COURSE LEARNING OUTCOME:

1. Mathematical Physics: After going through the course, the student should be able to

□ Revise the knowledge of calculus, vectors, vector calculus, probability and probability distributions.

□ Learn the curvilinear coordinates which have applications in problems with spherical and cylindrical symmetries.

□ Learn the Dirac delta function its properties, which have applications in various branches of Physics, especially quantum mechanics.

 \Box In the laboratory course, learn the fundamentals of the C and C++ programming languages and their applications in solving simple physical problems involving interpolations, differentiations, integrations, differential equations as well as finding the roots of equations.

2. Mechanics:

Course learning outcome:

After going through the course, the student should be able to

□ Understand laws of motion and their application to various dynamical situations, notion of inertial frames and concept of Galilean invariance. Will learn the concept of conservation of energy, momentum, angular momentum and apply them to basic problems.

□ Understand the analogy between translational and rotational dynamics, and application of both motions.

□ Write the expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions.

□ Understand the phenomena of collisions and idea about center of mass and laboratory frames and their correlation.

□ Understand the principles of elasticity through the study of Young Modulus and modulus of rigidity.

 \Box Understand simple principles of fluid flow and the equations governing fluid dynamics.

□ Apply Kepler's law to describe the motion of planets and satellite in circular orbit, through the study of law of Gravitation.

□ Explain the phenomena of simple harmonic motion and the properties of systems executing such motions.

Describe how fictitious forces arise in a non-inertial frame, e.g., why a person sitting in a merry-go-round experiences an outward pull.

□ Describe special relativistic effects and their effects on the mass and energy of a moving object.

□ appreciate the nuances of Special Theory of Relativity (STR)

□ In the laboratory course, the student shall perform experiments related to mechanics (compound pendulum), rotational dynamics (Flywheel), elastic properties (Young Modulus and Modulus of Rigidity) and fluid dynamics (verification of Stokes law,Searle method) etc.

3. ELECTRCITY AND MAGNETISM

Course learning outcome:

After going through the course, the student should be able to

□ Demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges.

□ Explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.

□ Apply Gauss's law of electrostatics to solve a variety of problems.

□ Articulate knowledge of electric current, resistance and capacitance in terms of electric field and electric potential.

□ Demonstrate a working understanding of capacitors.

□ Describe the magnetic field produced by magnetic dipoles and electric currents.

□ Explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields.

□ Understand the dielectric properties, magnetic properties of materials and the phenomena of electromagnetic induction.

□ Describe how magnetism is produced and list examples where its effects are observed.

□ Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor.

□ Apply various network theorems such as Superposition, Thevenin, Norton, etc. and their applications in electronics, electrical circuit analysis, and electrical machines.

□ In the laboratory course the student will get an opportunity to verify various laws in electricity and magnetism such as Lenz's law, Faraday's law and learn about the construction, working of various measuring instruments.

□ Should be able to verify of various circuit laws, network theorems elaborated above, using simple electric circuits.

4. WAVES AND OPTICS

Course learning outcome:

This course will enable the student to

□ Recognize and use a mathematical oscillator equation and wave equation, and derive these equations for certain systems.

□ Apply basic knowledge of principles and theories about the behaviour of light and the physical environment to conduct experiments.

□ Understand the principle of superposition of waves, so thus describe the formation of standing waves.

□ Explain several phenomena we can observe in everyday life that can be explained as wave phenomena.

 \Box Use the principles of wave motion and superposition to explain the Physics of polarisation, interference and diffraction.

□ Understand the working of selected optical instruments like biprism, interferometer, diffraction grating, and holograms.

□ In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Spectrometer experiments, Fresnel Bi-prism etc. Resolving power of optical equipment can be learnt first-hand.

□ The motion of coupled oscillators, study of Lissajous figures and behaviour of transverse, longitudinal waves can be learnt in this laboratory course.

5. THERMAL PHYSICS:

Course learning outcome:

□ Comprehend the basic concepts of thermodynamics, the laws of thermodynamics, the concept of entropy and the associated theorems, the

thermodynamic potentials and their physical interpretations.

□ Learn about Maxwell's thermodynamic relations.

□ Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equitation of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion.

□ Learn about the real gas equations, Van der Waal equation of state, the Joule-Thompson effect.

□ In the laboratory course, the students are expected to do some basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, temperature coefficient of resistant, variation of thermo-emf of a thermocouple with temperature difference at its two junctions and calibration of a

Thermo couple.

6. QUANTUM MECHANICS

Course learning outcome:

This course will enable the student to get familiar with quantum mechanics formulation.

□ After an exposition of inadequacies of classical mechanics in explaining microscopic phenomena, quantum theory formulation is introduced through Schrodinger equation.

□ The interpretation of wave function of quantum particle and probabilistic nature of its location and subtler points of quantum phenomena are exposed to the student.

□ Through understanding the behavior of quantum particle encountering a i) barrier, ii)potential, the student gets exposed to solving non-relativistic hydrogen atom, for its spectrum and eigen functions.

□ Study of influence of electric and magnetic fields on atoms will help in understanding Stark effect and Zeeman Effect respectively.

□ The experiments using Sci-lab will enable the student to appreciate nuances involved in the theory.

 \Box This basic course will form a firm basis to understand quantum many body problems.

 \Box In the laboratory course, with the exposure in computational programming in the computer lab, the student will be in a position to solve Schrodinger equation for ground state energy and wave functions of various simple quantum mechanical one dimensional and three dimensional potentials.

7. SOLID STATE PHYSICS

Course learning outcome:

At the end of the course the student is expected to learn and assimilate the following.

□ A brief idea about crystalline and amorphous substances, about lattice, unit cell, miller indices, reciprocal lattice, concept of Brillouin zones and diffraction of X-rays by crystalline materials.

□ Knowledge of lattice vibrations, phonons and in depth of knowledge of Einstein and Debye theory of specific heat of solids.

□ At knowledge of different types of magnetism from diamagnetism to ferromagnetism and hysteresis loops and energy loss.

□ Secured an understanding about the dielectric and ferroelectric properties of materials.

□ Understanding above the band theory of solids and must be able to differentiate insulators, conductors and semiconductors.

□ Understand the basic idea about superconductors and their classifications.

□ To carry out experiments based on the theory that they have learned to measure the magnetic susceptibility, dielectric constant, trace hysteresis loop. They will also employ to four probe methods to measure electrical conductivity and the hall set up to determine

the hall coefficient of a semiconductor.

8. ELECTROMAGNETIC THEORY

Course learning outcome:

□ Achieve an understanding of the Maxwell's equations, role of displacement current, gauge transformations, scalar and vector potentials, Coulomb and Lorentz gauge, boundary conditions at the interface between different media.

□ Apply Maxwell's equations to deduce wave equation, electromagnetic field energy, momentum and angular momentum density.

□ Analyse the phenomena of wave propagation in the unbounded, bounded, vacuum, dielectric, guided and unguided media.

□ Understand the laws of reflection and refraction and to calculate the reflection and transmission coefficients at plane interface in bounded media.

□ Understand the linear, circular and elliptical polarisations of em waves. Production aswell as detection of waves in laboratory.

□ Understand propagation of em waves in anisotropic media, uni-axial and biaxial crystalsphase retardation plates and their uses.

□ Understand the concept of optical rotation, theories of optical rotation and their experimental rotation, calculation of angle rotation and specific rotation.

□ Understand the features of planar optical wave guide and obtain the Electric fieldcomponents, Eigen value equations, phase and group velocities in a dielectric waveguide.

□ Understand the fundamentals of propagation of electromagnetic waves through optical fibres and calculate numerical apertures for step and graded indices and transmissionlosses.

□ In the laboratory course, the student gets an opportunity to perform experiments Demonstrating principles of

□ Interference, Refraction and diffraction of light using monochromatic sources of light.

Demonstrate interference, Refraction and Diffraction using microwaves.

□ Determine the refractive index of glass and liquid using total internal reflection of light.

□ Verify the laws of Polarisation for plane polarised light.

□ Determine Polarisation of light by Reflection and determine the polarization angle off or airglass surface □ Determine the wavelength and velocity of Ultrasonic waves in liquids using diffraction.

□ Study specific rotation of sugar using Polarimeter.

□ Analyze experimentally the Elliptically Polarised light using Babinet's Compensator

□ Study Experimentally the angle dependence of radiation for a simple dipole antenna

□ Plan and Execute 2-3 group projects for designing new experiments based on the Syllabii.

9. STATISTICAL MECHANICS

Course learning outcome:

□ Understand the concepts of microstate, macro state, ensemble, phase space,

thermodynamic probability and partition function.

 $\hfill\square$ Understand the combinatoric studies of particles with their distinguishably or

indistinguishably nature and conditions which lead to the three different distribution laws e.g. Maxwell-Boltzmann distribution, Bose-Einstein distribution and Fermi-Diracdistribution laws of particles and their derivation.

□ Comprehend and articulate the connection as well as dichotomy between classical statistical mechanics and quantum statistical mechanics.

□ Learn to apply the classical statistical mechanics to derive the law of equipartition of energy and specific heat.

□ Understand the Gibbs paradox, equipartiti on of energy and concept of negative temperature in two level system.

□ Learn to derive classical radiation laws of black body radiation. Wiens law, RayleighJeans law, ultraviolet catastrophe. Saha ionization formula.

□ Learn to calculate the macroscopic properties of degenerate photon gas using BEdistribution law, understand Bose-Einstein condensation law and liquid Helium. Bosederivation of Plank's law

□ Understand the concept of Fermi energy and Fermi level, calculate the macroscopic properties of completely and strongly degenerate Fermi gas, electronic contribution to specific heat of metals.

□ Understand the application of F-D statistical distribution law to derive thermodynamic functions of a degenerate Fermi gas, electron gas in metals and their properties.

□ Calculate electron degeneracy pressure and ability to understand the Chandrasekharmass limit, stability of white dwarfs against gravitational collapse.

□ In the laboratory course, the students gets an opportunity to verify Stefan's Law of radiation and determine Stefan's constant.

□ Design and perform some experiments to determine Boltzmann' Constant.

 \Box Use Computer simulations to study:

i. Planck's Black Body radiation Law and compare with the Wien's Law and Raleigh -Jean's Law in appropriate temperature region.

ii. Specific Heat of Solids by comparing, Dulong-Petit, Einstein's and Debye's Lawsand study their temperature dependence

□ Compare the following distributions as a function of temperature for various energies and the parameters of the distribution functions:

i. Maxwell-Boltzmann distribution

ii. Bose-Einstein distribution

iii. Fermi-Dirac distribution

10. NUCLEAR & PARTICLE PHYSICS

Course learning outcome:

 \Box Learn the ground state properties of a nucleus – the constituents and their properties, mass number and atomic number, relation between the mass number and the radius and the mass number, average density, range of force, saturation property, stability curve, the concepts of packing fraction and binding energy, binding energy per nucleon vs. mass number graph, explanation of fusion and fission from the nature of the binding energy graph.

 \Box Know about the nuclear models and their roles in explaining the ground state properties of the nucleus -(i) the liquid drop model, its justification so far as the nuclear properties are concerned, the semi-empirical mass formula, (ii) the shell model, evidence of shell structure, magic numbers, predictions of ground state spin and parity, theoretical deduction of the shell structure, consistency of the shell structure with the Pauli exclusion principles.

□ Learn about the process of radioactivity, the radioactive decay law, the emission of alpha, beta and gamma rays, the properties of the constituents of these rays and the mechanisms of the emissions of these rays, outlines of Gamow's theory of alpha decayand Pauli's theory of beta decay with the neutrino hypothesis, the electron capture, the fine structure of alpha particle spectrum, the Geiger-Nuttall law, the radioactive series.

□ Learn the basic aspects of nuclear reactions, the Q-value of such reaction and its

derivation from conservation laws, the reaction cross-sections, the types of nuclear reactions, direct and compound nuclear reactions, Rutherford scattering by Coulomb potential.

□ Learn some basic aspects of interaction of nuclear radiation with matter- interaction of gamma ray by photoelectric effect, Compton scattering and pair production, energy loss due to ionization, Cerenkov radiation.

□ Learn about the detectors of nuclear radiations- the Geiger-Mueller counter, the scintillation counter, the photo-multiplier tube, the solid state and semiconductor detectors.

 \Box the students are expected to learn about the principles and basic constructions of particle accelerators such as the Van-de-Graff generator, cyclotron, betatron and synchrotron. They should know about the accelerator facilities in India.

□ Gain knowledge on the basic aspects of particle Physics – the fundamental interactions, elementary and composite particles, the classifications of particles: leptons, hadrons(baryons and mesons), quarks, gauge bosons. The students should know about the quantum numbers of particles: energy, linear momentum, angular momentum, isospin, electric charge, colour charge, strangeness, lepton numbers, baryon number and the conservation laws associated with them.

SOCIOLOGY

Programme Outcome:

Sociology studies the evolution of human society as well as social relationship among the members of society, their pattern of interaction and culture around the world by promoting scientific studies. The undergraduate programme in Sociology includes varieties of courses related to human society and its various aspects like introduction to Sociology, Indian Social System, Theoritical perspective in Sociology, Sociology of Social Change, Social Problems and Welfare, Sociology of Development, Society in North East India, Understanding Social Psychology, Mass Communication and Society, Globalization and Society, Industry and Society, Sociology of Health & Hospital Management etc.

<u>Programme Specific Outcome</u>: The objective of the course is to enrich the students with knowledge and ideas about a number of sociological aspects.

By going through this course -

- 1. Students will be able to understand the emergence and development as well as the importance of Sociology as a specific discipline of Social sciences.
- 2. Students will be accustomed with the theoretical framework of classical, modern and Indian Sociological thinkers, different approaches of studying society, the conceptual framework of Indian social systems and the changes in Indian social institution etc.
- Students will be able to understand different methods in social research, different social issues pertaining to the rise in social problems, different agencies that provide social welfare and securities etc.
- 4. Students will be able to understand social psychology and its different dimensions, sociological understanding and practical knowledge of mass communication, the process of globalization and its effects on human society, the meaning and ethos of science and technology, various social process like urbanization, industrialization, modernization westernization and it's impact on human society and environment.
- 5. Students will be acquainted with different socio-cultural life of the north eastern societies, the traditions and changing culture of different ethnic groups of the N.E.region, the concept of health and its relationship with social environments etc.

Course Outcome: After completing the course students will gain knowledge on different types of societies, their changes and development, problems and prospects and a number of issues relating to human interaction. Apart from theoretical knowledge , students can also have practical knowledge about their subject matter by involving in field studies. This course will help the students to pursue higher studies like Masters in Sociology, Cultural Studies, Tribal studies, Social Work, Mass Communication etc. This course will also enable the students to prepare themselves in many competitive examination relating to administrative services. Moreover the hands on training and practical knowledge on field survey may encourage the students to get employed in project based jobs.

Zoology

Programme outcome:

The main objective of the course is to provide in workable knowledge about biodiversity, their development and interaction with environment by way theory and field study by visiting nearby sanctuaries and national parks. The study of physiology, endocrinology, cell biology and molecular biology has been included to know basic knowledge on animal systems with the help of bio-instruments in laboratory. Students are also provided opportunity in firsthand knowledge of handling instruments for subject courses on Bioinstrumentation including Biostatistics, Biotechnology and Bioinformatics to keep them in touch and applicability of instruments in the field of Biology.

Specific outcome:

Students are made competent and lay foundation for appearing in entrance examinations for studying in university and other higher institutions. The course also familiarizes students with different approaches to the study of all major branches biological sciences. The course enables them to know oneself and the total environment that sustains life.

Course outcome:

The course prepares students for pursuing higher education in various allied courses of Zoology and may provide an edge in studying modern technology associated of Biological Sciences.