BRAJRAJNAGAR COLLEGE, BRAJRAJNAGAR
Department of Mathematics
2019 – 2020 Batch

The Programms aims at – Brajrajnagar College, Brajrajnagar

Acquired in-depth knowledge of Algebra, Calculus, Geometry, Differential Equation, and several other branches of Mathematics. The course of Mathematics is to equip the students with necessary Analytic and Technical Skills to handle problems of Mathematical Nature as well as practical problems in their day to day life.

Programme Specific Outcomes

The Bachelor's Degree in B.Sc. (Hons) Mathematics is awarded to the students on the basis of knowledge, understanding, skills, attitudes, values and academic achievements sought to be acquired by learners at the end of this program. Hence, the learning outcomes of mathematics for this course are aimed at facilitating the learners to acquire these attributes, keeping in view of their preferences and aspirations for knowledge of mathematics. Mathematics is the study of quantity, structure, space and change. It has very broad scope in science, engineering and social sciences. The key areas of study in mathematics are Calculus, Algebra, Geometry, Analysis, Differential Equations and Mechanics. Programme Specific Outcome of B.Sc. (Hons) Mathematics

- *Think in a critical manner.*
- *Familiarize the students with suitable tools of mathematical analysis to handle issues and problems in mathematics and related sciences.*
- *Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of mathematics and statistics.*
- *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.*
- *Encourage the students to develop a range of generic skills helpful in employment, internships and social activities.*

Bachelor's degree in mathematics is the culmination of in-depth knowledge of algebra, calculus, geometry, differential equations and several other branches of mathematics. This also leads to study of related areas like computer science, Financial Mathematics, statistics and many more. Thus, this programme helps learners in building a solid foundation for higher studies in mathematics. The skills and knowledge gained has intrinsic beauty, which also leads to proficiency in analytical reasoning. This can be utilized in modeling and solving real life problems. Students undergoing this programme learn to logically question assertions, to recognize patterns and to distinguish between essential and irrelevant aspects of problems. They also share ideas and insights while seeking and benefitting from knowledge and insight of others. This helps them to learn behave responsibly in a rapidly changing interdependent society. Students completing this programme will be able to present mathematics clearly and precisely, make vague ideas precise by formulating them in the language of mathematics, describe mathematical ideas from multiple perspectives and explain fundamental concepts of mathematics to non-mathematicians. Completion of this programme will also enable the learners to join teaching profession in primary and secondary schools. This programme will also help students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

1st and 2nd Semester

Paper	Course	Outcomes
DSC – 01	**Calculus**	This course will enable the students to 1. Use Leibnitz's Rule to evaluate Higher Ordered Derivatives 2. Study the Geometry of various types of functions 3. Evaluate limits with in determinant forms using L'Hospital Rule 4. To plot various curves in Cartesian and polar coordinate system 5. Evaluate the area volume etc using integration 6. Acquired knowledge in basic properties of Vector Functions
DSC – 02	**Discrete Mathematics**	This course will enable the students to 1. Understand the concept of Sets, Relation and functions 2. Learn the core ideas in Propositional Logic and predicticate Logic 3. Learn the core ideas in Permutation and Combination 4. Learn the core ideas to use generating functions to solve a variety of combinational problems 5. Learn the core ideas of basics of Graph Theory
G.E - 01	**Calculus and Differential Equation**	This course will enable the students to 1. Evaluate both Problems algebraically and graphically 2. Evaluate limits with indeterminate forms using L'Hospital Rule 3. Check the continuity of various types of functions 4. Differentiate various types of functions 5. Solve definite Integrals and Related Problems
DSC – 03	**Real Analysis**	This course will enable the students to 1. Understand many properties of the real line $\mathbb{R}$ and learn to define sequence in terms of functions from $\mathbb{R}$ to a subset of $\mathbb{R}$. 2. Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence. 3. Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers. 4. Students will appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.

DSC – 04	Ordinary Differential Equation	This course will enable the students to 1. Understand the genesis of ordinary differential equations. 2. Learn various techniques of getting exact solutions of solvable first order differential equations and linear differential equations of higher order. 3. Know Picard's method of obtaining successive approximations of solutions of first order differential equations, passing through a given point in the plane and Power series method for higher order linear equations, especially in cases when there is no method available to solve such equations. 4. Grasp the concept of a general solution of a linear differential equation of an arbitrary order and also learn a few methods to obtain the general solution of such equations. 5. Formulate mathematical models in the form of ordinary differential equations to suggest possible solutions of the day to day problems arising in physical, chemical and biological disciplines.
G.E – 02	Algebra	This course will enable the students to 1. The acquired knowledge will help students to study further courses in Mathematics like, group theory, ring theory and field theory and linear algebra. 2. It has applications not only in higher mathematics but also in other science subjects like computer science, statistics, physics, chemistry etc.

3rd and 4th Semester

DSC – 05	Theory of Real Functions	This course will enable the students to 1. Acquire working knowledge on the concepts and theorems of the elementary Calculus of functions of one Real Variables. 2. They will work out problems involving derivative of Real functions and their applications. They can use derivatives to analyses and sketch the graph of a function of one variable, can also obtain absolute value and relative maxima and minima of functions. This knowledge is basic and student can take all other analysis courses after learning this course. 3. Calculate definite integrals. Understand Fundamental Theorem of Calculus and are able to explain the difference between definite and indefinite integral 4. Use the fundamental theorem to calculate a definite integral when the integrand is given algebraically or graphically. Convergence or divergence of an improper integrals
DSC – 06	Group Theory - I	This course will enable the students to 1. Recognize the mathematical objects called groups. 2. Link the fundamental concepts of groups and symmetries of geometrical objects. 3. Explain the significance of the notions of closets, normal subgroups, and factor groups. 4. Analyze consequences of Lagrange's theorem. 5. Learn about structure preserving maps between groups and their consequences.

DSC – 07	**Partial Differential Equations**	This course will enable the students to: 1. Apply a range of techniques to solve first & second order partial differential equations. 2. Model physical phenomena using partial differential equations such as the heat and wave equations. 3. Learn classification of Partial Differential Equation and system of Differential Equation. 4. All these courses are important in engineering and industrial applications for solving boundary value problem.
G.E - 03	**Real Analysis**	This course will enable the students to 1. Understand many properties of the real line $\mathbb{R}$ and learn to define sequence in terms of functions from $\mathbb{R}$ to a subset of $\mathbb{R}$. 2. Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence. 3. Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers. 4. Students will appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.
DSC – 08	**Numerical Methods and Scientific Computing**	This course will enable the students to: 1. Students can handle physical problems to find an approximate solution. 2. After getting trained a student can opt for advance courses in numerical analysis in higher mathematics. 3. Use of good mathematical software will help in getting the accuracy one need from the computer and can assess the reliability of the numerical results. 4. Determine the effect of round off error or loss of significance.
DSC – 09	**Topology of Metric Space**	This course will enable the students to: 1. Students will learn to work with abstract topological spaces. 2. This is a foundation course for all analysis courses in future. 3. Identify the continuity of a function defined on metric spaces
DSC – 10	**Ring Theory**	This course will enable the students to: 1. Understand the basic concepts of group actions and their applications. 2. Recognize and use the Sylow theorems to characterize certain finite groups. 3. Know the fundamental concepts in ring theory such as the concepts of ideals, quotient rings, integral domains, and fields. 4. Learn in detail about polynomial rings, fundamental properties of finite field extensions, and classification of finite fields.

G.E – 04	Numerical Methods	This course will enable the students to: 1. Students can handle physical problems to find an approximated solution. 2. After getting trained a student can opt for advance courses in Numerical analysis in higher mathematics. 3. Use of good mathematical software will help in getting the accuracy one need from the computer and can assess the reliability of the numerical results, 4. Determine the effect of round off error or loss of significance.

5th and 6th Semester

DSC – 11	Multivariate Calculus	This course will enable the students to: 1. Learn conceptual variations while advancing from one variable to several variables in calculus. 2. Apply multivariable calculus in optimization problems. 3. Inter-relationship amongst the line integral, double and triple integral formulations. 4. Applications of multivariable calculus tools in physics, economics, optimization, and understanding the architecture of curves and surfaces in plane and space etc. 5. Realize importance of Green, Gauss and Stokes' theorems in other branches of mathematics.
DSC – 12	Linear Algebra	This course will enable the students to: 1. Understand the concepts of vector spaces, subspaces, bases, dimension and their properties. 2. Relate matrices and linear transformations, compute Eigen values and Eigen vectors of linear transformations. 3. Learn properties of inner product spaces and determine orthogonality in inner product spaces. 4. Realize importance of adjoint of a linear transformation and its canonical form. 5.
DSE - 01	Linear Programming	This course will enable the students to: 1. Analyze and solve linear programming models of real life situations. 2. Provide graphical solutions of linear programming problems with two variables, and illustrate the concept of convex set and extreme points. 3. Understand the theory of the simplex method. 4. Know about the relationships between the primal and dual problems, and to understand sensitivity analysis. 5. Learn about the applications to transportation, assignment and two-person
DSE – 02	Probability and Statistics	This course will enable the students to: 1. Analyze and solve probability and statistics for various random variables, multivariate distributions, correlations and relations. 2. He shall learn law of large numbers and shall be able to do basic

		numerical calculations.
DSC - 13	**Complex Analysis**	This course will enable the students to: 1. Visualize complex numbers as points of $\mathbb{R}\diamond$ and stereographic projection of complex plane on the Riemann sphere. 2. Understand the significance of differentiability and analyticity of complex functions leading to the Cauchy Riemann equations. 3. Learn the role of Cauchy Goursat theorem and Cauchy integral formula in evaluation of contour integrals. 4. Apply Liouville's theorem in fundamental theorem of algebra. 5. Understand the convergence, term by term integration and differentiation of a power series. 6. Learn Taylor and Laurent series expansions of analytic functions, classify the nature of singularity, poles and residues and application of Cauchy Residue theorem.
DSC - 14	**Group Theory - II**	This course will enable the students to: 1. The knowledge of automorphism helps to study more on field theory. 2. Students learn on direct products, group actions, class equations and their applications with proof of all results 3. This course helps to opt for more advanced courses in algebra and linear classical groups, Field Theory, Direct Products
DSE – 03	**Differential Geometry**	This course will enable the students to: 1. A student will learn on Serret-Frenet formulae. 2. Relation between tangent, normal and binomials. 3. First and second fundamental forms and ideas on various curvatures. 4. He has scope to take more advanced courses in surface theory and geometry 5. Trains a student using tools in calculus to derive intrinsic properties of plain curves and space curves
DSE – 04	**Number Theory**	This course will enable the students to: 1. Basic definitions and theorems in number theory, to identify order of an integer, primitive roots, 2. Euler's criterion, the Legendre symbol, Jacobi symbol and their properties 3. Understand Modular arithmetic number-theoretic functions and apply them to cryptography.

DEPARTMENT OF BOTANY	
Programme Outcome:	The programme aims at creating and developing advanced research and theoretical skills in the branch of science. It gives a knowledge of structure, growth, development and metabolism of plants, algae, fungi. The programme provides a complete learning and training in plant forms, molecular genetics, geographical distribution, biotechnology and cell.
Programme Specific Outcome:	- This gives a platform for an academic and professional carrier. - Candidates have a wide range of job opportunities in the area of pharmaceuticals and chemical industries, research and development, environmental protection and public health sectors, clinical research etc. - Students learn to carry out practical work in the field and in the laboratory with minimal risk. - Students use research-based knowledge and research methods including design of experiment, analysis and interpretation of data and development of the information to provide valid conclusion.
Course	**Course Outcomes**
1st Semester	
P-I Microbiology and Phycology	On completion of the course, students are able to know the systematic position, structure and life cycle pattern of bacteria, virus and algae.
P-II Biomolecules and Cell Biology	It enables the students to understand biochemical nature of cell and chemical nature of biomolecules.
GE –I Biodiversity (microbes, algae, fungi and archegoniate)	On completion of the course students will be able to know about all the aspects of microorganisms like bacteria, viruses, algae, fungi and bryophyte, pteridophyta and gymnosperm.
2nd Semester	
P-III Mycology and Phytopathology	Students are able to understand biodiversity of fungi and know economic importance of fungi.
P-IV Archegoniate	Helps to understand the morphological diversity and economic importance of Bryophytes, Pteridophytes and Gymnosperms.
GE-II Plant Physiology and Metabolism	Students know about mineral nutrition, photosynthesis, transportation and respiration in plants. They will be able to know about the process of nitrogen metabolism, carbohydrate

	metabolism etc.
3rd Semester	
P-V Anatomy of Angiosperms	Students understand the scope of anatomy, know various tissue system.
P-VI Economic Botany	Students gain knowledge about various plants of economic use.
P-VII Genetics	Helps the students to understand Mendelian and Neo- Mendelian genetics.
4th Semester	
P-VIII Molecular Biology	Gain knowledge about the mechanism of DNA Replication and know about genome and chromosome.
P-IX Ecology	Students are able to know about energy and nutrient flow through the environment.
P-X Plant Systematics	Students develop knowledge about identification and classification of plants.
5th Semester	
P-XI Reproductive Biology	Students gain knowledge on the method of pollination, fertilization and embryogeny.
P-XII Plant Physiology	Students learn about mineral, nutrition, photosynthesis and respiration in plants. They understand the process of transpiration, translocation of solutes.
DSE-I Analytical Techniques in Plant Sciences	Students will be able to understand and perform chromatography and cultural techniques in Botany. They will be able to know the details of microscopy and they will be able to understand the methods used in micrometry, microtomy and microphotography.
DSE-II Natural Resource Management	Students are able to know about the utility of plant resources that in turn enables them to contribute towards the management and sustainable use of natural resource.
6th Semester	
P-XIII Plant Metabolism	Students are able to know about various aspects and plant metabolism like nitrogen metabolism, carbon assimilation, carbohydrate metabolism etc.
P-XIV Plant Biotechnology	Students get knowledge about the Genetic Engineering, fundamentals of Recombinant DNA Technology and Principle of Plant Tissue Culture.
DSE-III Horticulture Practice and Post Harvest Technology	It has the ability to meet food requirement of growing population by eliminating losses. Post harvest technology has potential to create rural industries.
DSE-IV Industrial and Environmental Microbiology	Students will be able to know the cultivation

	methods of bacteria, yeast, fungi and virus. They will also learn principle, working and application of instruments viz. pH meter, spectrophotometer, centrifuge, viscometer and laminar airflow.

DEPARTMENT OF CHEMISTRY	
Programme Outcome:	This programme helps in learning the scientific skills and temper for higher research in the fields of pure chemistry and allied fields like molecular biology, genetics, material science, nano science and technology environmentalscience etc.
Programme Specific Outcome:	This course also prepares the students for jobs as chemist and technical assistants in various industries like fertilizers and polymers, pharmaceuticals, chemical plants, iron and steel industries, power generating plants, nuclear plants etc. As a whole this programme of B.Sc. (Chemistry Honours) holds a lot of promises and prospects for the students both in academic pursuits as well as employment. As has been observed over the years a B.Sc. in Chemistry is a very fruitful career build up course.
Course	**Course Outcomes**
Inorganic Chemistry	Elements and their compounds, their structures through various types of bondings, their behaviour and applications constitute this vast branch which provides very basic and fundamental knowledge for further studies of higher and complex Chemistry.
Organic Chemistry	This enables the students to understand the huge branch consisting of millions of compounds, their synthesis, properties and applications along with the mechanisms of reactions. Organic Chemistry helps the students to prepare for placement in various industries.
Physical Chemistry	Teaching and learning of Physical Chemistry constitute an important part of this course where students learn the critical aspects of physical phenomenon and laws governing them.
Green Chemistry	As a new, innovative and promising branch both

	for the teachers and students, Green Chemistry provides alternative pathways for synthesizing clean non- hazardous and energy conserving products. This do away with environmental ills. This course enables the students to explore alternative possibilities and reaction pathways in a more ecofriendly manner.
Polymer Chemistry	Polymer Chemistry constitute the mainstay of materials for human use and it trains the students on structure, properties and applications of macromolecules.
Industrial Chemistry	Pursuing this course students acquire basis knowledge in different aspects of industries and chemical processes. This study is of high use for the students to pursue a career in various industries.

DEPARTMENT OF PHYSICS	
Programme Outcome:	This programme will enhance students' understanding of relationship between science and society. It will help in development of scientific temper among students and enable them to perform experiments to verify the findings scientifically.
Programme Specific Outcome:	It is a modern age science that deals with technologies. It will enable students develop technologies like satellite, mobile, communication etc. After the successful completion of this programme the students can opt for career like Lab Technician, Radiologist Assistant, Accelerator Operator, Consulting Physicist, Research Assistant or Scientist.
Course	**Course Outcomes**
+3 Science 1st Semester:-	
Core-I:-Mathematical Physics	It develops an analytical skill applied in all physical science so as to enhance the experimental research.
Core-II:-Mechanics	It is the area of physics which revels the knowledge related to motion of physical objects and relates among force, work energy, matter and bridges between physical theory and applied physics.
+3 Science 2nd Semester:-	
Core-III:-Electricity & Magnetism	It exposes the theory and basis knowledge of electricity and magnetism age of science run.
Core-IV:-Waves & Optics	This branch is highly used in operating the devices for medical science. It is directly connected to the functioning of all important equipments like telescopes, microscopes, laser, optical fibre, spectroscope, x-ray, LED etc.
+3 Science 3rd Semester:-	
Core-V:-Mathematical Physics	It is to improve and enhance the formulating, analytical skill so as to make different branches of physics error free and precise.
Core-VI:-Thermal Physics	It explores the knowledge of mechanism related to the field of heat, temperature radiation and exchange of heat. So it is helpful to apply its theory in devices like heat engine, nuclear reactions, power plants, refrigeration etc.

Core-VII:-Analog System	This is the study directly connected to semiconductor devices like diode, PN-junction, transistor, amplifiers etc.
+3 Science 4th Semester:-	
Core-VIII:- Mathematical Physics	It develops an analytical, logical and formulating skill and to apply appropriate physical principles in all sciences.
Core-IX:-Elements of Modern Physics	It imparts knowledge of modern topics related to theory of relatively properties of a term uncertainty principle etc.
Core-X:- Digital System	It enhances to skill of analyse and interpret data and to use in software programming highly used in communication.
+3 Science 5th Semester:-	
Core-XI:- Quantum Mechanics	It provides the knowledge of physical properties at the scale of atomic and subatomic particles making an entrance to quantum field theory and quantum technology.
Core-XII:- Solid State Physics	This branch reveals the inherent properties of rigid matter, quantum mechanics, crystallography and condensed matter physics.
+3 Science 6th Semester:-	
Core-XIII:-Electromagnetic Theory	It establishes the basic principles of electrical and electronic circuits based on Maxwell's equation. It also locals with the interaction between electric field and magnetic field.
Core- XIV:- Statistical Mechanics	It develops the skill of mathematical frame work in statistical methods and probability to large macroscopic entities consisting of microscopic entities.

Scope and outcome of various subjects

+3 I/III Semester G.E.: - It includes Mechanics waves, Thermal physics, Electricity and Magnetism. Mechanics is to acquaint the students with phenomena related to motion, work, energy, power which are the basics of sciences waves and its propagation reveals and energy though wires and without wire. Thermal physics is to reveal the exploration of thermal energy and its conversion which is till now main sources of energy like power plants, nuclear reactions heat engines etc. Electricity and magnetic, the electronics and electrical appliances in modern age of science.

+3 II/IV Semester G.E.: - It mainly includes optics atomic physics, quantum mechanics and nuclear physics optics deals with the study of light which plays very important role in optical devices like telescopes, microscopes, spectroscopy and highly used in all testing equipments in medical sciences atomic physics and nuclear physics makes the students acquainted to know the mystery below and behind to surfaces as it deals with all micro particles and their play in matter and nature. Quantum mechanics reveals the truth and properties of atom and subatomic particles which can't be explained by classical theory.

+3 5th Semester: -
DSE-I: - Classical Dynamics: - it provides the theory and information regarding motion of macroscopic objects, atomical objects and general theory of relativity.
DSC-II: - Nuclear and Particle Physics: - it reveals the theory behind the structure of matter at atomic and subatomic level. It's applications are nuclear medicine, material engineering and extraction of energy by fission and fusion.

+3 6th Semester: -
DSE-III: - Nanomaterials and Applications: - it is to acquaint the students with its important applications nanomaterials in chemical industry, optics, fuel cell, censors, aeronautic industry, thermoelectric devices etc.
DSC-IV: - Basic Instruments: - It is to make the students familiar with basic instruments which are widely used in modern lite the instruments may includes mainly both electrical and electronic devices.

DEPARTMENT OF ZOOLOGY	
Programme Outcome:	The Zoology programme aims at the development of the students and will provide them lots and lots of knowledge. After studying the programme, the students would be eager to learn more about zoological science. This knowledge will help the students to innovate ideas. They would be able to realize their real potential and capabilities. This program will make the students an asset who would even encourage others to work for the betterment of the community as well as the nation. This would be beneficial for the individuals as well as the entire nation.
Programme Specific Outcome:	- To help the students gain more knowledge and make them eager to understand and know about the nature and basic concept of Cell Biology, Genetics, Taxonomy, Physiology, Ecology and Applied Zoology and to make them analyze about the relationship between the living organism(like animals, plants and microbes) with their environment. - To make the students follow the procedures in laboratories in the areas of Cell Biology, Genetics, Physiology, Biochemistry, Molecular Biology, Taxonomy, Developmental Biology, Immunology and Economic Zoology. - To help the students in learning the concepts of zoological science in Apiculture(Honeybee culture), Sericulture(Silkworm culture), aquaculture (culture of edible aquatic animals), pisciculture (culture of fish), polutry (fowl farming), diary farming etc. and help them to develop the entrepreneurship qualities in these fields. - To make the students realise about the importance of knowledge and to make them eager to learn about the research methodologies and effective communication. It also helps in developing the skills of problem solving methods through their projects and to encourage them for higher education and research activities.

Course	Course Outcomes
Animal Diversity: Non Chordates	• It helps to know about the structure, various physiological function and classification of Non-Chordates along with the specimens that is in the course.
Ecology	• It helps to gain knowledge about understanding the structure and different component parts of eco- system and the inter-relationship and interactions that occurs among the living organisms on earth. • It provides knowledge about different types of biodiversity in the world and and the biodiversity found in the ecosystem of India.
Animal Diversity: Chordates	• It provides knowledge about various physiological functions, adaptation with their environment and classification of chordates.
Cell Biology	• It helps to learn about the structure and function of basic unit of life i.e. cell and it's organelles. • It helps to know about the structure, function and different types of transportation that occurs through cell membrane . • It helps the students to learn about cell division like mitosis and meiosis and its regulation .
Animal Physiology: controlling and coordinating system	• It provides knowledge about different types of tissue and tissue system, nervous system, different types of muscles, reproductive system, endocrine system and their regulation in the body .
Fundamentals of Biochemistry	• It helps to know about the structure, classification and nomenclature of different macromolecules like carbohydrates, protein, lipids and nucleic acid (DNA and RNA) – their metabolism and biological importance. • It helps to learn about the different types of enzymes, mechanism of enzyme action,

	enzyme kinetics, their regulation and different factors that controls it.
Physiology : Life Sustaining System	• To impart the knowledge about metabolic process and physiological mechanism of human body like digestion, respiration, excretion and blood circulation that occurs inside the body of human which are essential for existence of life.
Comparative Anatomy of Vertebrates	• It helps to know about the anatomy of different vertebrates from fish to mammals like integumentary, skeletal, digestive, respiratory, circulatory, urinogenital, nervous system and sense organ of the body . • It helps in understanding about the evolution of simpler organism to more complex form .
Molecular Biology	• It provides knowledge about the structure of DNA-their replication and repair, mechanism of transcription and translation during protein synthesis. • It helps helps to understand the gene expression and their regulatory mechanism.
Genetics	• It helps to know the Mendel's Experiment and the law derived from it, linkage, crossing over and chromosomal mapping. It provides information about mechanism of mutation in gene and chromosome. • It helps in understanding about sex determination, extra chromosomal inheritance, recombination in bacteria and virus.
Development Biology	• It helps to acquire knowledge about embryological development of various animals like frog, chick and mammals. • The students would know about gamatogenesis, fertilization, different developmental stage of embryo, metamorphosis, aging, teratogenesis, art like IVF and stem cell culture.
Evolutionary Biology	• It provides knowledge about the origin and evolution of life on earth, different types of theories and evidences of evolution,

	HW equilibrium, genetic drift, specification, concept of origin and evolution of humans.
Animal Behaviour and Chronobiology	• It helps to understand about animal behavior and their response to different instinct, social and sexual behavior, various type of adaptation, circadian clock etc.
Immunology	• It helps to learn about the innate and adaptive immunity of the body, antigens and immunoglobilins, ELISA test, MHC molecules, Cytokines and their functions. • It helps to understand various type of hypersensitivity reactions, autoimmune diseases, vaccines-their types and production.

DEPARTMENT OF COMMERCE (2019-20)

Programme Outcome	After the completion of course, students will be able to understand the role of business and its implications on society, the conceptual knowledge of accounting and acquire skill of maintaining accounts, identify the a venues of marketing and techniques of communication to be successful in business and personal life, students can also able to recognize different value systems and ethics, understand the moral dimensions and accept responsibility.
Programme Specific Outcomes	The course offers :- • To solve problems related to employer, employee, investors and consumers with legal protection. • To prepare financial statements of business using accounting principles, concepts, conventions and provisions. • To develop necessary professional knowledge and skill in finance and taxation. • To implement traditional and modern strategies and practices of costing, economics, marketing management, auditing and taxation. • To develop the skill of students to equip themselves as successful entrepreneurs. • To develop competency in students to make them employable in the global market.
Course	**Course Outcomes**
Ist and IInd Semester Environmental Study Financial Accounting Business Law Micro Economics Business Communication	After the completion of these courses, students acquire basic knowledge of important business laws in-depth knowledge of financial accounting along with its practical application, basic concept of Economics, basic knowledge of the

Macro Economics
MIL

provisions of companies Act, 2013 and able to have confidence in managing cost issues and able to keep a check on cost control and taking managerial decisions. Students can also able to learn the way we should live and how we can develop sustainable strategies to protect the environment.

3rd & 4th Semester
Corporate Accounting
Income Tax Law & practice
Management Principle and Application
Business Statistics
Communicative English
GST and Indirect Tax
Fundamental of Data Management
Management Accounting
Principle of Marketing
Quantitative and Logical Thinking

After the completion of these courses, students acquire conceptual knowledge of the corporate accounting, Income tax, GST and other Indirect taxes and apply the principles thereof in their professional fields. Students can also able to make use of different management principles in course of decision making in different forms of business organization. They can also master the basics of data management, Business statistics, Principles of marketing, Communicative English, Quantitative and Logical Thinking etc.

5th & 6th Semester
Computerized Accounting and
E-filing of Tax Returns.
Fundamental of Financial Management.
International Business
Auditing and Corporate Governance
Business mathematics
Consumers Affairs and Customer Care
Business Research Methods and Project Works.

These courses enable to enhance the capability of students to management the most important asset of the organization i.e human being, which is much needed to ensure growth of organization. These courses are also help to know various aspect of investment in details, knowledge about principles and techniques of audit, to understand the role and importance of finance function and acquire basis finance management knowledge.

Students can also able to assess and apply a range of research method on a practical project and able to know the importance of international business and India's involvement with global business. They can also acquire basics of business mathematics, consumer Affairs and consumer care and computerized Accounting and E-filing of Tax Returns.

Department of History

Semester I

1. History of India-I
2. Social Formation and Cultural Patterns of The Ancient World

Semester II

3. History Of India-II
4. Social Formation and Cultural Patterns of The Medieval World

Outcomes

➤ Gain knowledge about prehistoric life and culture of India and an understanding of Ancient Indian Society.

➤ Learn the way of life and culture pre historic period of the world along with the dawn of civilizations. Able to compare the origin nature and composition of different societies in the ancient world.

Outcomes

➤ Acquire knowledge about the economy and society of ancient India from 300 B.C.E. to 300 C.E. It will enable them to know the polity and administration of ancient Indian dynasties like The Mouryas, The Guptas, The Kushanas, The Satavahanas, and The Gana Sanghas. Moreover, it will expand their knowledge regarding early medieval society, economy, and the religious beliefs of people in early medieval India. It also imparts knowledge about the evolution of Indian literature in various languages like Sanskrit, Pali, Prakit and Tamil.

➤ Understand the medieval societies across the world. Students will gain knowledge regarding Roman Republic,

slave society agrarian economy trade and urbanization of ancient Rome. They will know about feudal culture in medieval Europe. Besides, students will be informed about the society in the central Islamic lands, rise of Sultanate, Caliphate and origin of Shariah and Sufism.

Semester III

5. History of India-III
6. Rise of Modern West-I
7. History of India-Iv (C.1206-1550)

➤ Learn about Indian Feudalism and rise of Rajputs in early medieval period. They will acquire knowledge as to how socio-economic and political scenario changed in India due to the rise of Rastrakutas, Palas, Pratiharas, Rajputs and Cholas. Beside this paper enable them to gain information regarding social, economic, cultural and religious development in India during the given period.

➤ Knowledge about transition of socio-economic pattern in modern west from feudalism to capitalism. They will also know about colonial expansion religious reformation renaissance along with rise of new state system in European countries.

➤ To know about the political, administrative system of Delhi Sultanate. Students also know about the socio-economic condition of India. It imparts information about regional dynasties

and regional art, architecture, literature and religious reform movement (Bhakti Movement) of this period.

Semester 4

8. Rise Of Modern West-Ii
9. History Of India-V (C.1526-1605)
10. History Of India-Vi (C.1605-1750**)**

Outcomes

➢ To understand social, economic and political changes in modern west particularly in Europe during 17th and 18th century. Students acquire knowledge about mercantilism parliamentary monarchy and absolutism in Europe.

➢ To expand knowledge about the sources of early Mughal Empire and their historiography. Students obtain detail information about the great Mughal emperors like Babur, Humayun and Akbar. It also throughs light on their polity, society, economy and the religious Faith of Akbar; Sulk-i-kul (Din-i-ilahi).

➢ Know the literary sources of Mughal history from Jahangir to Aurangzeb. Expansion of Mughal empire under Jahangir, Shah Jahan and Aurangzeb. Students acquire knowledge about Mughal culture like art, architecture, trade and commerce and the causes of the downfall of the Mughal empire.

Semester 5

11. History of Modern Europe-I
12. History of India-Vii (C.1750-1857).

Outcomes

➢ To know about the causes of the French Revolution and its phases and fall of monarchy. It envisages the restoration of old hierarchy in Europe. Social, political, intellectual currents of radical movements (1830-1848). This paper imparts idea about the rise of nationalism and emergence of new nation states in Europe. It also makes students know about changing trends in demography, population, economic condition during the given period.

➢ Understand the literary sources of Mughal history from Jahangir to Aurangzeb. Expansion of Mughal empire under Jahangir, Shah Jahan and Aurangzeb. Students acquire knowledge about Mughal culture like art, architecture, trade and commerce and the causes of the downfall of the Mughal empire.

Semester 6

13. History of India-VIII
14. History Of Modern Europe-Ii (C.1780-1939)

Outcomes

➢ Understand renaissance in 19th century in India that brought about socio-cultural and religious reform in India and side by side instills nationalistic feeling and pride for the glorious past. This paper deals with Indian freedom movement from 1885 to 1947. Gandhian movements moreover, students acquire

knowledge about communalism, popular movements and partition of India.

> Knowledge about the workers movements for the establishment of socialism in the 19th and 20th century. Causes of Russian Bolsheviks Revolution and foundation of the U.S.S.R. Causes of the 1st world war and its consequences. This paper also imparts knowledge about the causes of the 2nd World War, imperialism, Fascism and Nazism. It also discusses institutionalization of disciplines History, Sociology and Anthropology.

Outcomes

DSE I, II , III & IV

1. Landmarks In Odishan History (Early Time To 1568)
2. Landmarks In Odishan History (C.1568-1950)
3. Cultural History Of Odisha
4. Archaelogy: Principles and Methods

> Learn history of Odisha from early time to 1568. This paper expands the knowledge of the learners regarding Ashoka and Kalinga war, Kharavela and his achievements. They also obtain knowledge about local kingdoms, imperial powers in Odisha. Moreover, this paper makes students know about the religious faith of ancient Odisha like Buddhism, Jainism, Saivaism Vaishnavism and Jagannath cult.

> Imparts knowledge about medieval Odisha. The Muslim rule and the Maratha rule in Odisha British conquest

of Odisha and protest by Odishan (Paik Rebellion). Students obtain knowledge about freedom fighters of Odisha. VIR Surandra Sai, Chakara Bisoyi and Dharani Naik. Besides, 1866 financial and growth of Odia nationalism are also included in this paper. Students learn about formation Odisha as a separate province. Growth of Odia literature and post-independence Odisha.

- aware of Odisha's social system from ancient time to modern. Students also gain knowledge about economic life of Ancient and Medieval Odisha along with religious beliefs of Odishan people.

- To know about archaeology as a part of historical studies relationship of archaeology with other social sciences. Students know about the methods and technique of exploration and excavation. Besides they know about study of pottery, stone tools and technological development of archaeological culture.

Generative Electives

1. Research Methodology
2. Issues In Contemporary India
3. Issues In Contemporary World

Outcomes

➢ Acquire knowledge about various facets of research methodology. They will learn how to interpret historical data. They will learn the relation history with other social sciences. This paper will enable them to learn different methods of historical research and writing history.

➢ Gain knowledge about the Government of India Act 1935, popular movements, partition of India, drafting of Indian constitution and merger of princely states. This paper also impart knowledge about Indian democracy at work from 1950-70s. Students will know about the economy, industry, labour science, education, status of women literature, art and culture of Post-Independence Era.

➢ To know about colonialism and nationalism, the 2nd World War, The UNO, Cold War and NAM. This paper enables them to know globalization, social movements like feminist, human rights issues, media and consumption.

Department of Odia

Semester I & II

1. History of Odia Literature
2. History of Modern Odia Literature
3. Post-colonial Literature

Outcomes

➤ After completion of this course students learn the growth and development of Odia literature and acquire the knowledge to approach literature with reference to socio-political, economic and religious background.

Semester III & IV

1. Evolution of Odia Literature
2. Functional Grammar
3. Popular culture & Literature
4. East-West Theories
5. Odia drama & one Act play
6. Ancient Odia Literature

Outcomes

➤ Students learn to approach literature with reference to Fiction, mythical, rhetorical and narrative writings written in the form of Champu, Boli, Chaupadi, Chautisa, Bhajan etc.

Semester V & VI

1. Evolution of Modern Literature
2. Odia stories : evolution & growth
3. Odia prose writing
4. Forms and definition of Odia literature. Its works and authors.
5. Development of Essays , drama, Novel, short stories etc.

Outcomes

➤ Enable students to place Odia literature alongside national literature.
➤ To imbibe nationalistic feeling and global relationship through modern writing.
➤ Comparative study of Odia Literature in relation to other Indian Literature
➤ Through this stories of essays drama and fiction.

Department of English

Programme outcomes:

This course in English while providing a sound knowledge to articulate and communicate effectively in social and professional contexts, it offers a critical insights in to the study of English literature to examine texts in the light of its different tradition S, genres and theories ranging from ancient to the modern. The knowledge acquired through this study can be applied to life skills, career choice, research and understanding of life in relation to the local and global scenario.

Programme Specific outcomes:

➤ To articulate and communicative in English effectively.
➤ To examine a text critically in the contexts of tradition and theories.
➤ To understand the socio, economic, politico, religious background of the age in which it is written.
➤ To apply literary awareness in everyday life while responding to immediate and global environment.
➤ To take higher study, research and career with confidence.

Sem. I & II	Outcomes
1. British Poetry and Drama: 14th to 17th Centuries 2. British Poetry and Drama: 17th and 18th Century 3. British Prose: 18th Century 4. Indian Writing in English	➤ Introduces the students to the seminal texts of 14th century England and Renaissance and the subsequent growth of drama and poetry of various genres up to 17th century. It also offers to give an insight in to study of prose/essays with emphatic shift from reason to emotion that grew in 18th century. In addition IWE as a genre is introduced mainly focusing on the interplay of indigenous vs. alien through selected texts of poetry, drama and novels.
Sem. III & IV 5. British Romantic Literature 6. British Literature 19th Century 7. British Literature: Early 20th Century 8. American Literature 9. European Classical Literature 10. Women's Writing	**Outcomes** ➤ Enable students to get an overview of romantic revival and the growth of literature after world War with emphasis on freedom, subjectivity and return to nature. It also offers to study 19th century British literature viz fiction, cultural criticism etc. With a background knowledge of the socio- economic, political scenario of the period. ➤ . Enable students to the modernist canon of poetry, novel and literally criticism as an aftermath of 1st world War in 20th century England. Besides,

	the course offers a background study of America literature through selected texts of poetry, drama and fiction. Students learn the works of women writers of different cultures, nations and genres and the critical issues underlying such texts. The European classical literature of Greece and Rome starting from 8 Bc helps in building a critical sense of understanding the later texts.
Sem. V & VI Modern European Drama Indian Classical Literature DSE –I Literary Theory DSE-II World Literature Postcolonial Literatures DSE-III Popular Literature DSE-IV Partition Literature Writing for Mass Media AECC Communicative English	**Outcomes** ➢ Acquaint the students with the experimental and innovative literature of modern Europe as a resultant growth of politics, social change and stage performance. ➢ Learn to study literature that respond to European colonialism and empire through a body of writing in post independence space. ➢ Acquaint students to various children's literature, detective and folklore as a genres. ➢ DSE 1:enables to learn the basic premises and theoretical approaches to literary text. ➢ DSE 2: read literature written all over the world not in English but translated from other regional languages into English. ➢ DSE 3: enables students to read literature about Indian partition and the subsequent experience of trauma and loss. ➢ DSE 4: acquaints the students with the various forms of journalistic writing such as print and media as part of literature. ➢ Communicative teaching emphasis on the actual needs of the English language to provide students with comprehensive use of English language, for communication of opportunities, its focus is not only a language in the form, grammatical accuracy, more emphasis on the appropriateness of language use.

Department of Economics

Programme Outcomes

The programme aims at giving the students an understanding of the theory and principles of Economics and the application of mathematical tools in the critical thinking of theories in problem solving. The course offers an overview of Indian economy and helps students to pursue further education, undertake research and choose a career in professional fields with confidence.

Programme Specific Outcomes

- ➢ Enable students to get a clear understanding of the theories and principles of economics.
- ➢ Gives an overview of the macro- micro, banking systems of the Indian economy.
- ➢ Offers an insight in to analysis and interpretation of data but means of mathematical tools.
- ➢ Helps students to pursue higher study, undertake research and work as professional in the field.

Semester I & II	Outcomes
1. Introductory Microeconomics 2. Mathematical Economics 3. Introductory Macroeconomics 4. Mathematical Economics	➢ Microeconomics theory enables students to explore subjects viz. Scope and method, economic problems scarcity and choice and the basic aspect of price, profits, incentives through graphs. ➢ Mathematical economics is the application of mathematical method to represent theories and analyze problems in economics. ➢ Enable students to understand the basic concept of Macroeconomics and its variable like saving, investment, GDP, Money Inflation, balance of payment. ➢ To apply mathematics techniques to economic theory such as sets, real variables, derivative linear models, dynamic method etc.
Semester III & IV 5. Intermediate Microeconomics 6. Intermediate Macroeconomics 7. Statistical Method 8. Intermediate Microeconomics II 9. Intermediate Macroeconomics ii 10. Research and Methodology	**Outcomes** ➢ The course of this paper provides a rigorous intermediate level treatment of microeconomic theory with applications to business and public policy. ➢ The goal of this paper is to provide students with a rigorous overview of modern macroeconomics ➢ Statistical knowledge helps students to use the proper method to correct datas, employ the correct analysed and

	effectively presents the results. ➢ Helps in analysing and accessing microeconomic policies implication and advantage. ➢ Research and Methodology is a specific procedures or techniques used by a students to identify, select, process and alalyze information about topic. In a research paper the methodology select allows the reader to Critically evaluates a study's overall validity and reliability. ➢ This course aims to brings students up-to date with modern development in macroeconomic theory and offer fresh perspective on the challenges of the day.

Semester V & VI
  1. Indian Economy (I & II)
  2. Development Economics (I & II)
	Outcomes
	
	➢ It helps students to understand different characteristics of world demographic and explain how population growth affects other economic circumstances.
	
	➢ It aims to students up to date with modern development in macro economic theory and an offer fresh perspective on the challenges of the day.

DSE I, II, III, IV
  1. Money and Banking
  2. Public Economics
  3. Environmental Economics
  4. International Economics
	Outcomes
	
	➢ Banking Theory helps a student to understand simple articles concerned with monetary economics and banking theory and apply to current events key modes and concept of monetary economics and banking theory.
	
	➢ It introduces students to the major themes of public economics & to develop their skill in using microeconomics.
	
	➢ It provides students with an economics perspective on environmental issues.
	
	➢ The course introduces the students to the main concept of international economics and be familiar with the main economic theories & models of International Trade.

DEPARTMENT OF EDUCATION	
Programme Outcome:	The course will help to develop scientific attitude towards teaching learning process and enable the learners to become a good citizen by imbibing values of virtue.
Programme Specific Outcome:	On the completion of the programme students will be able to acquire skills and competencies to become a successful teacher, counselor, administrator, curriculum planner and policy maker.
Course	**Course Outcomes** **After completion of the course students will be able to-**
Educational Philosophy	• Establish relationship between Education and Philosophy. • Describe and appreciate the contribution of Indian School of Philosophy , Western School of Philosophy and the Great Indian Thinkers to the field of Education.
Educational Sociology	• Explain the interrelationship between Education and Society • State different agencies of education and their functions. • Describe the role of Education towards social change, social control, modernization and globalization. • Describe the role of education for ensuring equity and inclusion.
Educational Psychology	• Establish relationship between Education and Psychology and its relevance for a teacher. • Understand concepts like growth and development, intelligence, creativity, learning, motivation and personality and the different principles or theories associated with it.
Changing Pedagogical Perspective	• Define different terms like teaching, learning and establish relationship between them. • Understand different theories of teaching, principles and maxims of teaching and approaches and methods of teaching and use it in teaching learning process.

Pedagogy of Language	• Describe pedagogical approaches of teaching language subjects. • Develop subject specific lesson plan, prepare teaching-learning materials and construct test.
Pedagogy of Social Science and Mathematics	• Describe pedagogical approaches of teaching social science/mathematics subjects. • Develop subject specific lesson plan, prepare teaching-learning materials and construct test.
Statistics in Education	• Explain Statistics and its usage in Education. • Compute measures of central tendency and dispersion and correlation. • Describe the importance of normal probability curve.
Curriculum Development	• Describe the meaning, components, types of curriculum, the curriculum development and evaluation process.
Guidance and Counseling	• Explain the meaning and types of guidance and counseling and organization of guidance services in a school.
Educational assessment and evaluation	• Describe test, measurement, assessment and evaluation and its role in Education. • Develop a good achievement test.
Educational research	• Explain different types of Educational Research. • Understand research design, data analysis and Interpretation. • Prepare a Research Proposal and Report.
History of Education in India	• Critically examine the Education System during Ancient India, Medieval India, British Period and Independent India.
Educational Management and Leadership	• Elaborate the concepts of Educational Management, Institutional Management, Leadership in Education and Total Quality Management
Contemporary trends and issues in Indian Education	• Describe the challenges in Elementary Education, Secondary Education and Higher Education and importance of UEE, SSA, DPEP,RMSA and RUSA. • Analyze the emerging concerns in Education like Human Rights Education and Life skills Education.

ICT in Education	• Explain the meaning and importance of ICT in Education • Describe the usage of various ICT resources in classroom and school.
Inclusive education	• Understand the meaning, genesis and scope of Inclusive Education • Explore policies and frameworks facilitating Inclusive Education • Understand support needs of students with disability
Development of Education in Odisha	• Learn the structure of Educational System in Odisha • Understand the status of Elementary Education, Secondary Education, Higher Secondary Education, Higher Education and Teacher Education in Odisha
Policy and Practices in school/ Higher Education in India	• Explore the policies framed, analyse the problems and evaluate the progress of School/Higher Education in India
Project work	Prepare a project on educational problem.

Department of Political Science

Programme outcome

      Political science helps the students to know their rights and duties towards the society and state. It helps them to understand the different theories, ideologies of various political thinkers and about the local, national, and international political affairs. This programme aims to make the students good citizen whereby they may take active part in the day to day political activities of the state. It also helps them in their future career.

Programme Specific Outcome

➢ It enables the students to know about the basic principles of political science.

➢ It gives the knowledge about the Indian constitution, local & urban self government, organs of government, administrative process.

➢ It widens the knowledge of the students in the fields of comparative politics, international relations and western and Indian political thoughts.

➢ It gives the opportunities to students for higher studies, research works and various all India comparative exams.

Semester 1&2
COURSE
  1. Understanding Political Theory
  2. Constitutional Government And Democracy In India.
  3. Political Concepts And Debates
  4. Political Process In India
	Outcomes
	➢ Helps the students to understand the basic ideas of Political theory, its history, approaches and reflections on the ideas and practices related to democracy.
	➢ Enables the students to know about the constituent assembly, constitution of India, Government and its organs and functions of democracy in India since independence.
	➢ Makes the students clear understanding of basic normative concepts such as FREEDOM, EQUALITY, JUSTICE and RIGHTS.
	➢ Deals with the working modern political institutions in India, which helps the students to develop their understandings regarding party system, voting behaviours, religion & politics, caste & politics in India.

Semester 3 &4
COURSE
  5. Introduction to Comparative Government and Politics.
  6. Perspective of Public Administration
	Outcomes

7. Perspective on International Relations and World History. 8. Political Process and Institutions In Comparative. 9. Public Policy and Administration In India. 10. Global Politics	➢ Helps the students to acquire knowledge about the basic concepts to study the comparative politics. ➢ The purpose of this course is to take the students understand about the various historical & modern approaches of public administration. And also the various public policies undertaken by the government. ➢ Helps the students to know the importance and various determinants of international relations. The role of world history of twentieth century in the International relations
Semester 5 &6 **COURSE** 11. Classical Political Philosophy 12. Indian Political Thoughts 13. Modern Political Philosophy 14. Indian Political Thought II. 15. Citizenship In Globalizing World 16. Human Rights in Comparative Perspective. 17. Development Process and Social Movement In Contemporary India. 18. Indian Foreign Policy in a Globalizing World	➢ The aim of this course is to familiarize the students with electoral system, party system, nation state system of different states. ➢ Helps the students to know the administrative policy, decentralisation of power, financial system, citizens & administration and administration in the social welfare of India. ➢ Gives the introductions to the students about the term globalization with various dimensions like social, political, economic & technological and makes them aware of the contemporary global issues. **Outcomes** ➢ Introduces the students with ancient political philosopher and their political thoughts regarding political ideas. ➢ Helps the student to understand about the classical Indian political thought and their ideas about the laws, state, polity, kingships and monarchy. ➢ Seeks to develop the knowledge of

	the student about the modern, liberal, radical, romanticism thoughts and political questions of existence.
	➤ Enables the students to broaden thIer knowledge in modern Indian political thoughts and theories of Rights, Gender, Swaraj Community, Hindutva, Secularism and Socialism.
	➤ Students come to know about the concept of citizenship, legal and political rights of the citizenship in political community in the modern age.
Generic Electives 1 &2 **COURSE** 1. Nationalism In India 2. Gandhi And The Contemporary World. 3. Understanding Ambedkar 4. Governance : Issues And Challenges	➤ Deal with human rights of different states. It helps the students to understand specific issues with regards to human rights and important for the students to understand the different forms of human rights.
	➤ Proposes to introduce students to the conditions, contexts and forms of political contestation over development paradigms and their bearing on the recovery of voice of citizens.
	➤ Helps the students to know the Genesis and practice of India's foreign policy. India's relations with superpowers. India's negotiating styles and strategies in international issues.
	Outcomes ➤ Aims to help the students to understand the freedom struggle of India from British colonialism.
	➤ Helps the students to know the Gandhian Principles. Its importance and implications in the modern world.
	➤ Deals with the concept of governance and highlights major issues and challenges of governance in contemporary time.
	➤ Gives knowledge of Ambedkar philosophy and its relevance in the modern India. It widens the idea of

	students with regards to Caste, Religion Gender, Cultural and Women issues.