Programme Outcomes
Programme Specific Outcomes
&
Course Outcomes

Programme Outcomes, Programme Specific Outcomes & Course Outcomes

Programme Outcome (PO): Program outcomes are statements about knowledge, abilities, and attitudes (attributes) that students ought to possess after a formal program (for example, a three-year degree course in Arts/Science/Commerce). POs deal with the general aspect of a graduate program as well as the skills and knowledge a graduate will have after completing the program. POs are more general statements that outline what students should study and be able to do after receiving their bachelor's degree. It also depicts the skills and knowledge a graduate should have upon completion of a program. PO for a program has been adopted by the National Board for Accreditation (NBA), primarily based on initial capabilities, competence, skills, etc, and is unique for a particular program.

Programme Specific Outcomes (PSO): Statements that describe the outcome of specific subject-based programs included in POs and help students understand how the skills they acquire in a particular program would directly contribute to the advancement of society and its sustainability.

Course outcomes (CO): They are precise, quantifiable declarations of the information, abilities, and attitudes that students will have acquired by the end of a course as included in PSOs. Course-specific learning outcomes indicate a demonstrated activity that is ideally be observable, measurable, and attainable within a predetermined time frame.

Programme Outcomes

Bachelor of Arts

The students admitted to the BA program are expected to develop the following quality which would help them in their future life to reach their expected goals.

- Knowledge of Language
- Realization of society's duties and
- Responsibilities to society's critical temper and
- A creative mind to understand diversity and finally
- Discover the meaning of life.

Bachelor of Science

- Understanding of basic scientific principles
- Develop an ability to analyze and think about the scientific events around the world and the ability to explain everything scientifically
- Capacity building to handle every situation in a scientific way
- Contribute to society through scientific ideas

Bachelor of Commerce

Allow students to develop managerial and analytical skills, financial literacy, business acumen, and leadership skill.

- The program is structured to provide the students with managerial skills and disciplines related to Trade, Commerce, Industries, and corporate affairs.
- Enables students to take decisions at personal and professional levels.
- Develop business acumen, managerial skills, and abilities of accounts.
- Provides knowledge for start-ups by encouraging entrepreneurship spirit among students and encouraging them to participate effectively in social, commercial, and civic senses ultimately leading to development of nation.

Programme Specific Outcomes

&

Course Outcomes

DEPARTMENT OF BENGALI

Under CBCS system, the Course of Bengali Language & Literature has been divided into various partsfor the Students of Honours and Programme/Regular Course. Generic Elective (GE), Skill Enhancement Course (SEC), Discipline Specific Elective (DSE), Language Core Course (LCC), Ability Enhancement Core Course (AECC).

Bengali is our Mother Language and literature is the mirror of society. There is a great opportunity to know the History of its Language and Literature, Rhetoric Prosody, Linguistic along with selected History of Sanskrit, English literature and native literature. This course has the potential to be successful in the workplace in the future by acquiring good Bengali writing and speaking ability as well as creativity.

PAPER OUTCOME:

Within 14 Core Course for Hons. Papers, there are so many Interesting and Knowledge caring topic in the syllabus, like Old and Medieval, Modern and Post-Modern Bengali Literature, along with History of English, Sanskrit Literature and native language. Moreover, Linguistics, Bengali Drama, Short Story, Novel, Essays, FolkLiterature and Tagore Study. Extensive knowledge on literature, society, human life etc. can be gained by the students through the course.

Program Specific Outcome:

Develop a strong concept of linguistics and basic Bengali grammar, history of old, medieval and modern Bengali literature. The students should possess the fundamental knowledge of Bengali Prosody, Rhetoric, Deferent literary theory, like Tragedy, Comedy, Romanticism, Classicism, Epic, Ode,Ballad etc. Old Indian Kabyatattwa Charyapada, Baishanab Padabali, Ramayan, Mangal Kavya, Bhagbat, Mahabharata, Shakta Padaboli and Annadamangal, Chandimongal etc.

Students are enabled to transfer and apply the acquired concepts and principles to study different branches ofBengali literature that is fiction, short story, essay and poetry.

Understand the principles and application of classification of Drama, Novels, and Poetry. Develop a conceptionof aesthetic sense and understand the interdisciplinary approach.

DEPARTMENT OF BENGALI

Programme Specific Outcomes

- knowledge and understanding of basic Bengali grammar
- knowledge and understanding of essential Bengali vocabulary
- knowledge and understanding of the appropriateness of basic Bengali structures andexpressions in a given context
- knowledge and understanding of Poetry of 19th & 20th century knowledge and understanding of History ofBengali Literature

- knowledge and understanding of basic Bengali linguistics

COURSE OUTCOMES

History of Bengali Literature (1801 – 2000)

Studying History of Bengali Literature helps students to know their country, Religion, society, culture and the development of the literary techniques used in the prose or poetry written in the Post-Renaissance age. In brief it enlarges our vision to see our own literature, manifestation of our nationality transformation of content, form and style of writing through ages and indication of future directions in literature as well Linguistics

Linguistics

Linguistics is the scientific study of language. Since language is the most important means of communication undoubtedly it has a very important social purpose. Majoring in linguistics means fine the way of learning many aspects of the Bengali language-including sounds, words, sentences and meaning. Students will understand Bengali language in an historical context and they will learn how Bengali language changed over time and how it varies from situation to situation and place to place. Study of Linguistics will also help in making the foundation of language stranger and will improve the practical and intellectual skills.

Poetry of 19th & 20th century

Aristotle said "Poetry is more philosophical then History. W.B. yeats in modern age said, hear and see the world and shrink from all that is of the bran only." Apart from all these philosophical views, poetry of the poets – belonging to different centuries improves the vocabulary; it gives new ideas by opening up the mind of students. It also helps the learner to know about the relationship between language and reality.

History of Bengali Literature (Old and Medieval)

- To make students interested in Bengali Society, culture, literature and history of the Bengali people.
- To create a sense of history and historical analysis amongst students.
- To create a sense of logic-dependent evaluation and critique of literature.
- To make students aware about basic textual nuances of Medieval Bengali Literature.
- To acquint students with Old and Medieval version of Bengali Language.
- To make students aware about the evolution of the history of Bengali Literature and Culture.
- To give the idea of the inextricable interconection between Literature and Culture.
- To create a strong foundation of studying future course of literaure.

Rhetoric and Prosody

- To make students aware about the importance of Rhetoric and Prosody while studying poetry.
- To give practical lessions of Rhetoric and Prosody to students.
- To prepare students about the ornamental use of language in constructing sentences while speakingand writing. Introducing the foundation of Prosody along with the basic knowledge of Linguistics.
- Introduce to the students about the aesthetics of language while studying Prosody.
- To make students aware about Indian idea of Rhetoric and Prosody.

Theory of Poetry and Translation:

- To introduce students about the basic features of Lyrical poetry.
- Introduce Students about the idea of Narrative Poetry.
- Give the basic idea of Translation Theory to students.
- To instruct students of how to read an Ancient Indian Epic and how to analysis the complex Textualnetworks of the text.
- Introduce the basic premises of Vaisnava Literary and Poetic Theory.
- Give the basic lessons of Literary and Poetic Aesthetics.
- To inspire the students of creating their own register in creative writing.

Religious Literature in the Medieval Period

- To give students basic ideas about the transition of Literature between two different historical periods.
- To give basic ideas about the Court Literature of the contemporary Medieval Period to the students.
- To make them aware about the deep connection between literature and history.
- Make students aware about the mixtures of multiple languages in Bengali Literature.
- To make students aware about Shakta Religion and Philosophy.
- To make students aware about Shaktapada and Shakta alphabet.
- To give basic ideas about Religious Literature and Social values of this form of literature.
- To create a sense of analysis power and nurture the ability of expression amongst students.

BENGALI (GENERAL)

Through this curriculum students learn to translate fro English to Bengali and contrarily from Bengali to English.Moreover they acquire skill in proof-reading, formal letter-writing, reporting or various affairs etc. Exercise of all these methods will help students in getting jobs as translator, professional Proof-reader or Reporter in News agencies and thus the course of study is building proficiency required for getting employed in different field.

DEPARTMENT OF BENGALI

After successful completion of the three-year B.A. (Honours) degree program in Bengali, students should beable to achieve the following objectives/ outcomes:

Program Specific Outcomes (PSO):

1. Develop a strong concept of linguistics, history of old, medieval and modern Bengali literature. The studentsshould possess the fundamental knowledge of Bengali Rhythms, Alonkar, ‘Baishanab Padabali’, ‘Ramayan’ , ‘chandimangal’,‘Annadamangal’.

2. Students are enabled to transfer and apply the acquired concepts and principles to study different branches ofBengali literature that is fiction, short story, easy and poetry.

3. Understand the principles and application of classification of Drama, Novels, and Poetry.
Develop aconception of aesthetic sense and understand the interdisciplinary approach.

Course Outcomes (CO):

CO1: Develop ideas on History of Bengali literature and linguistics.

CO2: Analyses Bengali Rhythms, Alonkar and develop ideas on classic Bengali poetry.
CO3: Increase conception of Bengali fiction and short story.
CO4: Understanding about the classification of easy, poetry and criticism.

CO5: Students will be capable of oral and written communication about the classification of drama and historyof Bengali theatre.

CO6: Students will demonstrate ideas about Epic, Lyric, Epistle, Classicism, Surrealism, Romanticism,Imagism. CO7: Students will demonstrate knowledge of selected fiction.

CO8: Students will demonstrate the interdisciplinary approach.

DEPARTMENT OF BENGALI

PSO:

- Develop a strong concept of linguistics, history of old, medieval and modern Bengali
- literature. The students should possess the fundamental knowledge of Bengali Rhythms, Alonkar, Baishanab Padabali, Ramayan, Bhagbat, Mahabharata, Shakta Padabali and Annadamangal. Studentsare enabled to transfer and apply the acquired concepts and principles to study
- Different branches of Bengali literature that is fiction, short story, essay and poetry. Understand theprinciples and application of classification of Drama, Novels, and Poetry.
- Develop a conception of aesthetic sense and understand the interdisciplinary approach. CO: Developideas on History of Bengali literature and linguistics.
- Analyses Bengali Rhythms, Alonkar and develop ideas on Ramayan, Bhagbat,
- Mahabharata, Shakta Padabali , Baishnab Padabali,Chandimangal and Annadamangal.
- Increase conception of Bengali fiction and short story, essay and novel.
- Understanding about the classification of essay, novel, poetry and criticism.

VJAYGARH JYOTISH RAY COLLEGE

Vision and Student Learning Outcomes of the department of Bengali Mission

The Department of Bengali of Vjaygarh Jyotish Ray College under University of Calcutta follows the syllabus of U.G course, which according to University of Calcutta and that syllabus offers diverse and flexible curriculum designed to help students prepare for meaningful careers in government, public service, acting ,stageperforming, journalism, teaching and other related areas. Students also participate in different seminars and/or different programs like foundation course on Human Rights appropriate to their career goals and interests.
Student Learning Outcomes

Bengali Outcome

No. 1: Knowledge of the Field -- Concepts, Theories, and Methods

- Students learn the defining concepts and theories of Bengali language, literature, cult and culture whichwill help to fit for our society.
- Students learn about the methods and tools of Bengali syntax and folk culture, beside of that they aredeveloping their creative writing skill.

Bengali Outcome

No. 2: Writing -- Academic Writing and Information Literacy

- Students learn to effectively use argument and to communicate claims to know in academic writingappropriate for the discipline like Wall Magazine.
- Students learn to evaluate and use evidence to support empirical claims to know in writing. Through thecareful reading of texts and the analysis of argument and evidence, students will develop the skills necessary to clearly, thoughtfully, and persuasively communicate in writing. Students will develop and practice these skills throughout the curriculum.

Bengali Outcome No. 3:

- Critical Thinking Students learn to apply learned concepts, theories, and methods, as well as their mastery of argument and evidence to produce and communicate original research which analyzes and explains relevant Bengali language and literature phenomena -- in both writing and orally.

Bengali Outcome No. 4:

- Students successfully completing a specialization in the study of Folk literature in under graduate level and so many special concepts will develop to studying with M.A in Bengali. Be able to describe and explain Bengali theory and systems around the world, explore Bengali.
- Literature in the international arena, Understand the fundamental concepts, issues, and theoriescentral to comparative language and international relations.
- Be able to explain the similarities and differences between various types of cultural language andhow they affect for the society.

Note: Subject of Bengali language and literature is such as human activity that is best understood bybringing theory and practice together through experience and application

Department of English

Program Outcome

1. B.A Program (General)

Bachelor of Arts is an undergraduate course offered in the subjects such as English, Bengali, History, Political Science, Education, Journalism, Philosophy, intended to equip our studentsfor certain courses and jobs with definite skills and abilities:

a. After graduation from B.A Program most of the students go forfurther studies like M.A or B.Ed.

b. After completing graduation students become eligible to apply for Civil Service examinations like IAS, IFS, IPS, Indian DefenceService etc.

c. Students also become eligible to go for the law courses. Theymay have a choice to go for the respectable jobs in different financial institutions such as the banks and LIC.

d. B.A Programs equip our students with some soft skills that areof use in the professional courses like Hotel Management, Fashion Designing, Mass Communication and Journalism or Social Work.

e. A B.A graduate can also look for computer certified courses likeweb designing, animations, graphics etc.

f. Another option open to the graduates is a course related toguidance and counselling.

2. Course Specific Outcome of English Honours

The course specific outcome of B.A English Honours are not onlylimited to the discipline itself. The following outcomes may be noted:

a. Primarily the program aims to introduce ample variety of

literature in the English language. It offers our students the opportunity to read and respond to a large spectrum of novels,plays and poetry across different genres.

a. The course aims to develop an enthusiastic sense of awareness of students' surroundings through works of literature. They are invited to understand how a particular piece of literature is a reflection of the historical, sociological, cultural, political and even the psychological ethos of its time.

b. In purely humanistic terms, the course aims to broaden the outlook, empathy, imagination of our students, thereby enablingthem to connect with the world in a meaningful way.

c. Even in matters of practical career options students are spoilt by a plethora of choices. After successfully completing B.A English Honours students are greeted with career like media and advertising, writing and publishing, journalism, public relations, content writing and blogging, creative writing, teaching and academia, communications and law.

Department of Education

B.A. (HONS) PROGRAM

Program Outcome:

In addition to the expertise himself in respective fields, a B.A. student it will realize the human values, moral norms a sense of social service, become a responsible citizen, develop logical thinking and good moral behavior.

B.A. (HONOURS IN EDUCATION)

Program Specific Outcome:

The students will understand the basic concept and system in education and can apply them in the real-life situation. Hair he also be acquainted with the recent trends of this discipline. They are also able to make a stable foundation for the post-graduation course and other related fields.

SEMESTER/ PAPER	**TITLE**	**COURSE OUTCOMES**
SEMESTER-I		
CC-1	INTRODUCTION TO EDUCATION	1. To introduce the students to the basic concept of education. 2. To acquaint the students with the factors of agencies of education.
CC-2	HISTORY OF INDIAN EDUCATION	1. To introduce the students to the salient features of education in India. 2. To ensure the students to identify the relevance of fact which are comparable to modern education.
SEMESTER-II		
CC-3	PSYCHOLOGICAL FOUNDATION OF EDUCATION	1. The course provides understanding and concept of psychological foundation of education, different aspect of human development and the factors of cognition.
CC-4	PHILOSOPHICAL FOUNDATION OF EDUCATION	1. Students will be able to realize the relation between philosophy and education. 2. They are also able to analyze the development of humanity through different schools of philosophy.
SEMESTER-III		
CC-5	SOCIOLOGICAL FOUNDATION OF	1. To bring awareness and sensitivity among the students towards contemporary

	EDUCATION	sociological issues of education. 2. Students will be able to understand the social change and social interaction in education.
CC-6	EDUCATIONAL ORGANISATION MANAGEMENT AND PLANNING	1. To understand the basic concept of ideal organization and all institution. 2. Students will acquire the expertise knowledge of educational management and planning.
CC-7	GUIDANCE AND COUNSELLING	1. To introduce the students to the basic idea and types of guidance and counselling. 2. They will be able to identify, apply the relevant tools and techniques for counselling basic data.
SEC	SKILL FOR DEMOCRATIC CITIZENSHIP	1. After completion of the course student will able to enhance their skills about the duties and rights of the citizen and also different Acts like child violence, domestic violence etc.
SEMESTER-IV		
CC-8	TECHNOLOGY IN EDUCATION	1. Student will be able to acquaint with the system approach in education. 2. This course will provide the basic knowledge of understanding of ICT, e-learning as well as instructional techniques.
CC-9	CURRICULUM STUDIES	1. Students will be able to realize the relation among curriculum, pedagogy and assessment. 2. They will acquire the basic knowledge of formulation, implementation and evaluation of curriculum.
CC-10	INCLUSIVE EDUCATION	1. After completion of this course student will be able to realize the difference between inclusion and exclusion and to understand the philosophy of inclusion i.e. the international calling- Education for all. 2. Students will be able to set up their minds for building up the inclusive society.
SEC-2	TEACHING SKILL	1. After completion of this course students will be able to enhance their skill related to basic ideas of teaching. 2. They will be able to frame a design of good teaching learning strategy.
SEMESTER-V		
CC-11	EVALUATION AND MEASUREMENT IN EDUCATION	1. Students will be e acquainted with the process of evaluation and measurement in education. 2. They will be able to know the principles of test construction which are relevant for

		their further studies and research.
CC-12	STATISTICS IN EDUCATION	1. After the completion of their course, students will be able to develop the concept of statistics and to develop skills in analyzing descriptive data. 2. They will be able to apply their knowledge in research method in education.
DSE-A1	EDUCATIONAL THOUGHTS OF GREAT EDUCATORS	1. Students will be able to understand the educational ideas of Indian and great educators as well as the pedagogical concept given by them.
DSE- B2	OPEN AND DISTANCE LEARNING	1. After completion of the course students will be able to answer of the modes and strategy of open and distance education. 2. They will be able to assume the relationship among formal non formal correspondence distance and open learning and the use of multimedia in that course.
SEMESTER-VI		
CC-13	PEDAGOGY OF ADJUSTMENT	1. They will be able to perform the multi-axial classification of mental health. 2. Student will be able to acquire the basic coping strategy for stressful situation and to know the administration scoring and interpretation of the psychological test.
CC-14	BASIC CONCEPT OF EDUCATIONAL RESEARCH	1. After completion of this course students will be able to follow the various steps for conducting a research. 2. They will be able to write a research proposal and to review related studies and to write the research papers.
DAC-A2	POPULATION EDUCATION	1. Students will be able to understand population, growth and its impact on education. 2. They will be able to identify the problems related to population explosion as well as the reason for suggestive measures.
DSE- B2	WOMEN EDUCATION	1. After completion of this course students will be able to know the historical perspective of women education. 2. They will be able to identify the major constraints of women education and women empowerment.

DEPARTMENT OF HISTORY

Program Outcome of Bachelor of Arts (B.A.)

1. Student seeking admission for B.A. programme are expected to imbue with somequalities which help them in their future life to achieve some expectedgoals.
2. The students acquire knowledge in the field of social sciences, literature and humanitieswhich make them sensitive and sensible human beings.
3. The B.A. graduates will be acquainted with the social, economic, historical, geographical,political, ideological and philosophical tradition and thinking.
4. The program also empowers the graduates to appear for various competitive examinations orchoose the post graduate programme of their choice.
5. The B. A. program enables the students to acquire the knowledge with human values framingthe base to deal with various problems in life with courage and humanity.
6. The students will be ignited enough to think and act over for the solution of various issuesprevailed in the human life to make this world better than ever.
7. Programme provides the sturdy platform to the students to be the responsible and dutiful citizen with realization of human values and a sense of social service.

Programme Specific Outcomes
History (Honours and General)

1. Understand the various methods of analysis with basic understanding of Historiography.
2. Preparing the students learn to analyse the relations between the historical texts, narratives andthe contemporary society.
3. Comprehend the application of theories in studying the historical narratives.
4. Understand the socio-economic and cultural development of a society.
5. Know the evolution of history of mankind from Stone Age to Globalization.
6. Learning the ability to critically perceive historical timeline.
7. Understand the role of psycho-social entities in the making of history.
8. Make the students aware about the necessity of studying environment and the need to apply thehistorical principles in reality.
9. Understandbackground of our religion, customs institutions, administration and so on.
10. Understand the present existing social, political, religious and economic conditions of the people.
11. Analyserelationship between the past and the present is lively presented in the history.
12. Develop practical skillshelpful in the study and understanding of historical events.

They(a) Draw historical maps, charts, diagrams etc.

(b) Prepare historical models, tools etc.

13. Develop interestsin the study of history and activities relating to history.

They:

(a) Collect ancient arts, old coins and other historical materials.

(b) Participate in historical drama and historical occasions.

(c) Visit places of historical interests, archaeological sites, museums and archives.

(d) Read historical documents, maps, charts etc.

(e) Play active roles in activities of the historical organizations and associationsand

(f) Write articles on historical topics.

14.The study of history helps to impart moral education.
15.History installs the feeling of patriotism in the hearts of the pupils.

COURSE OUTCOME-HISTORY (HONOURS AND GENERAL)

Unlike before, History as a subject today, is no longer considered as the study of past deeds of kings and emperors. Onthe contrary, in accordance with the present concept of history, courses are designed to create a sense ofthe past, in a more comprehensive manner. History now puts emphasis on the economy and culture of thedistant and not so distant past so that empires do not seem to have been created in a vacuum; so that thereader while having a more complete sense of the time under discussion can logically explain the factspresented. History, now therefore, does not appear as conglomeration of discrete facts, the facts, rather,appear before the reader as a series of logically interconnected events with a definite context. Further,writing history today underscores the process of reconstructing the past with complete reference to thesources of information.Moreover, the historian is now expected to explain the reasons for arriving at aconclusion.In other words, a mere description of events does not suffice any more. The course that weteach our undergraduate students not only satisfies these conditions but it also doesn't restrict itself toIndian history alone. To give the students a more complete sense of the past histories both ofneighbouring countries and those of more distant geographic areas are included in the syllabus. It is thusexpected that a student who has successfully completed her undergraduate studies with history as a subject ofstudy would:

1. Know the 'Meaning of History', a meaning that includes the people of the land as much as the rulers.
2. They would be able to know their glorious past and would be able to form a logical connection betweenthe present and the past.
3. They would therefore, be able to explain much of the present social practices and would precisely knowthe proper context for their present existence.
4. They would also learn how to trace back known historical facts—things they had learned in school—tothe sources of information. This on the other hand, would teach and interest some of them to conductresearch and write academic papers in the future.

Department of Philosophy

1. PROGRAMME OUTCOME

- The programmer BA in Philosophy helps students to analyze the ways in which humans experience the world and develop a sense of value. Students would acquire knowledge of core concepts, distinctions, theories, argumentative techniques, movements, and influential figures, within the core fields of aesthetics, ethics, epistemology, logic, metaphysics, and social & political philosophy.
- The study of philosophy is intrinsically as well as extrinsically valuable and the students can develop the ability in critical thinking skills. They will be able to reason clearly and carefully, employing the principles of logic to construct cognate arguments in both of their speech and writing. Their capacity to reason clearly and carefully will be manifest in their use of deductive reasoning skills, wherein the conclusion is embedded in the conditions that are known, given, or accepted, as well as inductive reasoning skills, wherein one must reason beyond the conditions that are known, given, or accepted.
- A person pursuing a Bachelors course in philosophy, understands the concept of right and wrong, understands the moral principles and their application in everyday life. Concepts of philosophy develops in students a sense of the value and a reflective attitude and sensitivity towards philosophical judgments, and a life-long commitment to learning and inquiry.
- A student or scholar of Philosophy would develop the ability to summarize and explain difficult ideas and concepts on their own. He/she will be able to think creatively and independently, exploring possibilities beyond those deep-rooted existing opinions and practices.
- The students also develop the ability to understand reality from different perspectives and examine different sides of an issue and make them understand reality from different perspectives and thus realize that different people will define issues in different ways.
- This discipline encourages students to read and interpret philosophical texts to explore knowledge about ancient, medieval and contemporary philosophical thoughts

2. PROGRAMME SPECIFIC OUTCOME

Semester 1

The entire course of semester 1 deals with the Indian philosophical concepts. There is a division between astika and Nastik philosophy. According to this the school of Indian philosophy differed. The law of Karma and the concept of purushartha occupies most important place in Philosophy, and this course has given the detailed idea about Jainism Buddhism, Nyaya-Vaishesikha system of philosophy.

Semester 2

This course discuss about Shamkhya, Mimamsa, Advaita Vedanta and VisistadvaitaVada which will enable students to develop critical thinking. Another part of the semester discussed about western philosophy. The theories of Locke Berkeley, Hume and Kant Will give deep knowledge about causation analytic - synthetic judgements, metaphysical and transcendental expositions of the ideas of space and time, immaterialism, substance, qualities, identity theory and scepticism. This course has been designed to increase knowledge of students at a greater level.

Semester 3

This course has been designed to provide an overall knowledge about Psychology. various methods of psychology, idea of sensation and perception, different theories of learning, levels of mind and the concept of personality- these are the theories which will help to to know psychological matters in a scientific way. Another section of the semester has focused on the area of social and political philosophy. It includes the theory of society, community, Association,

social class and caste, secularism, Marx Engels Theory of social change and democracy. This content stimulates the students to understand the political thought and the work of philosophy in it.

Semester 4

This course has been divided into three parts- Western logic -1, Western logic -2 and epistemology -metaphysics. This course deals with the logical concept principles. The process to make sound arguments. On the other hand the understanding of the metaphysical world and the world of knowledge will increase student's capacity in a broader way.

Semester 5

This course has been designed to provide a detailed knowledge about Nyaya logic and Epistemology, and Indian ethics. It includes definition of buddhi or jnana,smriti,anubhava,prama,a-prama,karana,kinds of cause, pratyaksha, sannikarsa and anupalabdhi- these theories will help students to have the knowledge about Nyaya system of philosophy with respect to Tarkasamgraha and Deepika of Annambhatta. Indian ethics is focused on Buddhist ethics, Jain ethics, Mimamsa ethics and the concept of Dharma. The entire area of it will have a great impact on students.

Semester 6

This course has been divided into three parts- Nyayalogic and epistemology, Western ethics and discipline specific elective course. This entire course includes Annambhatta's ideason Anumana, Pakshadharma,Hetvabhasa, Upamana, Saktigraha, Laksana and Arthapatti in one hand, on the other hand Western ethics has focused on nature of ethics, moral -non moral action, standards of morality and theories of punishment which will help students to know the ethical aspect of philosophy. The discipline specific course has discussions about Swami Vivekananda life and philosophy. This special course will help to know about spirituality and human nature in a broader way.

3. COURSE OUTCOME

Semester	Course Code	Course Name	Course Outcome
I	PHI-A-CC1	Indian philosophy - I	Students will acquire some spiritual knowledge which will help them to understand our nature and universe.
	PHI-A-CC2	History of western Philosophy - I	Students will gain intellectual development of science, politics, epistemology, logic and even art.
II	PHI-A-CC3	Indian philosophy - II	Students will get deeper knowledge about the mystery of the creation of the universe.
	PHI-A-CC4	History of western Philosophy -II	Students will be able to relate philosophical ideas and movements to their historical background.
III	PHI-A-CC5	Philosophy of Mind	Students will have the ability to solve various problems relating to our mind.
	PHI-A-CC6	Social and Political philosophy	Students will get some thoughtful consideration of human society and at the same time they will get knowledge of a justification for coercive institutions.

	PHI-A-CC7	Philosophy of Religion	Students will understand and evaluate different religious traditions and their alternatives.
	PHI-A-SECA	Man and Environment	Students will be aware of nature, environment and the world.
IV	PHI-A-CC8	Western Logic – I	This will help them to understand the structure , terminology, and language of an argument
	PHI-A-CC9	Western Logic – II	Students will gain knowledge about Formal logic which will help them to discriminate between valid and invalid inference forms and to explore the relations that hold among valid ones.
	PHI-A-CC10	Epistemology and Metaphysics (Western)	students will come to know about the study of knowledge
	PHI-A-SECB	Philosophy of Human Rights	students will be able to have the knowledge of reality
V	PHI-A-CC11	Indian Logic and Epistemology – I	Students will have the capacity to generate true cognition or knowledge whether for oneself or for others.
	PHI-A-CC12	Ethics (Indian)	This study will help students to look at his\her own life critically and to evaluate his\her actions or choices
	PHI-A-DSEA1	Normative and Meta Ethics	Students will have knowledge about the real reality which is beyond our perception.
	PHI-A-DSEB1	Śrimadbhagabadgīta	Students will get knowledge about the core ethics of Gita
VI	PHI-A-CC13	Indian Logic and Epistemology – II	students will be able to know the various theories of knowledge
	PHI-A-CC14	Ethics (Western Ethics)	The study of moral philosophy will help students to think better about morality.
	PHI-A-DSEA2	Applied Ethics	This study will help students to treat moral problems, practices and policies.
	PHI-A-DSEB2	Swami Vivekananda	This study will provide the idea of the potential divinity of every being.

DEPARTMENT OF POLITICAL SCIENCE

COUESE OUTCOME

Semester I

Understanding Political Theory: ConceptsCode: PLS-A-CC-1-1-TH+TU,

Understanding Political Theory: Approachesand DebatesCode: PLS-A-CC-1-2-TH+TU

The objective of the study is to understand the changing meaning, nature and scope of political – science and various methods and approaches of the study of the political – science..The topic will help to understand about the evolution of social contract theory of Hobbes,Lockeand Rosseau and the nature of Liberal and Neo-Liberal Theories. To understand the how nations, states, countries and governments differ, how a state expresses legitimacy, how the concept of monistic and pluralistic theories have implication on the state.The topic intend to discuss about the classification democratic theories to have ideaon model of democracies elaborated by renowned political scientists.

To study the Marxian class theory asserts that an individual's position within a class hierarchy is determined by his or her role in the production process, and argues that political and ideologicalconsciousness is determined by class position.The objective of the unit is to study political philosophy of Marxism and Leninism,that seeks toestablish socialiststates and develop them further. To study through the leadership of a revolutionary vanguard, the part of the working class who come to class consciousness as a result of the dialectic of class struggle.

Semester II

Constitutional Government in India Code: PLS-A-CC-2-3-TH+TU

Politics in India:Structures and ProcessesCode: PLS-A-CC-2-4-TH+TU

The objective is to understand the history behind the framing of Constituent Assemble,understanding the need for and role of constitution for democratic structure of India. To study the key features of the constitution and understandthe fundamental rights and duties of Indian citizens. The objective of the lesson is to elaborate describe the qualifications and method of election of the President of India. explain the executive, legislative, financial and judicial powers of the President;explain the position of the President; describe the role of the Vice-President in the Indian Political System;describe how the Prime Minister is appointed and how his/her Council of Ministers is constituted;explain the powers and functions of the Prime Minister and his/her Council of Ministers; analyses the meaning and implications of the individual and collective responsibility.To study the composition, powers and functions of the Parliament and compare the position of RajyaSabha and LokSabha; and appreciate the role of the Supreme Court of India by explaining its organization and jurisdictions, its power of Judicial Review and impactjudicial activism on our day to day life.

To study the procedure of constitutional amendment and analyse the ,appointment, powers and functions of the governor,Chief Minister, Council of Ministers in governance of the state .The objective of the study is to discuss the need for political parties in India, list of political parties in our country, identify the challenges faced by the political parties,express the need for reforming political parties.

To study describe the composition of the Election Commission of India; enumerate the functions the Election Commission and explain its role; recall the procedure of election from the announcement of schedule, to the declaration of the result; mention various stages in the electoral process.

To understand the importance of religious andlanguage division in Indian Society. The negative effects of the caste system and initiative for the development tribes will be studied in order to understand the social system. To understand the humanistic and judicious outlook of the emergence of social movement and its effect on the Indian society.

Semester III

Indian Political Thought– I Code: PLS-A-CC-3-5-TH+TU

Comparative Government and PoliticsCode: PLS-A-CC-3-6- TH+TU

Perspectives on International RelationsCode: PLS-A-CC-3-7-TH+TU

To acquaint the students to have in-depth understanding on the plethora of areas of Indian political thought.The topic offers theoretical and ideological underpinnings of the political and social conflicts surrounding regulatory politics, and the role of law in state formation.

To acquaint the students to have in-depth understanding on the plethora of areas involving political systems of the developed countries.To study the comparative study of politics and government of different countries.To study major approaches and theories of comparative politics, as applicable to liberal democratic, communist and post-communist, and developing Third World systems, will constitute an important part of the course.

To understand the political system of USA,UK,PRC .The objective of the unit intended for undergraduate students to understand and political system of USA, UK and China. It combines theoretical analysis with factual introduction, with the aim of enabling students to be quickly familiar with constitutional issues in China, USA, UK. The aim of this topic is to explore the executive branch of UK, USA,France and Russia. Moreover, existence and functioning of parliamentary and presidential form of government and comparison between these three countries will analyzed in detail.

The objective of the study is to explore the relation between functioning of three branches of the government(executive, legislative and Judiciary) of USA,UK and PRC. To study the role and duties of heads of UK, USA and France.The comparative analysis of role, duties, appointment and structure of the British the Prime Minister and President of USA will be explored in detail.

The objective is to enable the students to have a clear of International Relations as a field of study covers factors and processes that affect the interactions among states and non-state actors across national boundaries.The purpose of the study of International Relations theory to provide a conceptual framework upon which international relations can be analyzed.To understand the history of the orientation of India's foreign policy under Premiership of PanditJawaharla Nehru. The evolution of NAM, PanchsheelDooctrine and other economic diplomacy are studied in detail.

Semester IV

Indian Political Thought IICode: PLS-A-CC-4-8-TH+TU

Global Politics since 1945Code: PLS-A-CC-4-9-TH+TU

WESTERN POLITICAL THOUGHT AND THEORY I

The aim of the study is to have better understanding of problems of the world. It helps to understand the true importance of collective security and disagreement. To understand the foreign policies of the existing worldorder. How the geographic, economic and demographic factors determine the independent foreign policy of a nation.

To understand the history of the cold war that grew out of long disagreements between the Soviet Union and the United States. Moreover the topic will enable the students to understand the aftermath of cold war

and evolution of the New World Order that brought a dramatic change in world political thought and the balance of power. The objective is to impart a clear picture on transition of Europe post –cold war era and the history of the evolution of European Union for the development of Europe. To understand the contemporary relevance of ASEAN, NAM, SAFTA in the present world order and to safeguard the political and economic stability of the region against big power rivalry.

To understand the history of Aristotle who has dealt with the most important aspects of political science. He is regarded as the founder of comparative politics. His theory of revolution is still regarded as unique. We study, with a good deal of interest, his classification of constitution.. Plato has dealt with a number of concepts such as justice, ideal state, laws etc. But his main interest concentrated on the ideal state. We know Plato primarily as a philosopher and secondarily as a political thinker. To understand the Philosophical writing about politics during the middle ages (as during the earlymodern period) was often an attempt to influence public events, and the history of the subject therefore involves reference to those events. It also involves reference to developments in medieval culture, e.g., the renaissances of the ninth and twelfth centuries, and to the development of institutions such as the legal system and the universities. The strong relationship during this period between philosophy and religion also complicates the story. These "extra-philosophical" connections are among the reasons why political philosophy underwent considerable development in the course of the middle ages, as religious and political thinking was modified by cultural developments and the stress of events.

The topic intends to discuss about the Middle Ages, where, the church controlled the religious world and interpreted the principles of Christianity to facilitate its own designs. The church also controlled the political sphere as a result of which politics lost its identity. King, state and important political concepts became tutelage of church. The Reformation of the church started with Martin Luther and for tins reason it is also called Lutheranism or Lutheran movement. It is so called because Reformation is closely associated with Martin Luther's name.Bodin's notion of sovereignty is that the power the sovereign holds must be absolute and permanent.

To understand Hobbes's struggle to create a science of politics, and his insistence that there was no area of experience that was not susceptible to scientific analysis, Hobbes was a man who transcended his times. But he was a man of his time and expressed the interests of his class and the experiences of the social layer to which he belonged.

The aim is to enable the students to understand that, Locke is one of the founders of "liberal" political philosophy, the philosophy of individual rights and limited government. Locke speaks of a state of nature where men are free, equal, and independent. He champions the social contract and government by consent.

In this paper we discuss Rousseau's numerous forms of government that may not look very democratic to modern eyes, but his focus was always on figuring out how to ensure that the general will of all the people could be expressed as truly as possible in their government. He always aimed to figure out how to make society as democratic as possible.

Semester V

WESTERN POLITICAL THOUGHT AND THEORY II Code: PLS-A-CC-5-11-TH+TU

Political SociologyCode: PLS-A-CC-5-12-TH+TU

Bentham's moral theory was founded on the assumption that it is the consequences of human actions that count in evaluating their merit and that the kind of consequence that matters for human happiness is just the achievement of pleasure and avoidance of pain.The main ideaof the civil society isan establishment of individual person's freedom. Hegel in his definition of civil society presented a model thatbecame the basis for many theories explaining the essence of civil society.

Political sociology is the study of power and the relationship between societies, states, and political conflict. It is a broad subfield that straddles political science and sociology, with “macro” and “micro” components.

Semester VI

Public Administration-- Concepts and PerspectivesCode: PLS-A-CC-6-13-TH+TU

Administration and Public Policy in IndiaCode: PLS-A-CC-6-14-TH+TU

The objective of the study is to understand the definition of Administration and Public Administration describe the nature of Public Administration , explain the scope of Public Administration,distinguish between Private and Public Administration.. To understand the difference development administration and Public administration, to study the reasons behind the emergence of New Public administration.

To understand how Public Administration has become an important branch of the modern Government. It is regarded as ‘heart’ of modern civilization, also as ‘backbone of states’ machinery. Max Weber, a German Sociologist, in his analysis of Bureaucracy, had made Bureaucracy most important part of the study of Western Political Science.

The aim of the topic is to understand ecological approach to public administration is based on understanding the interrelationship between the administration and everything that forms its environment. The ecological approach to Public Administration was first popularized by Fred W. Riggs. He tried to understand the disparity between the administrative systems of developed and the developing countries.The objective is to elaborate Models of policy-making and their critique; Processes of conceptualization, planning, implementation, monitoring, evaluation and review and their limitations; State theories and public policy formulation.

The course is designed to offer perspectives on Indian administration in a broader framework of India’s long trajectory of historical and political experiences. It provides a comprehensive framework to understand the administrative structures and practices in the postcolonial context.
The course also deals with the contemporary issues such as decentralisation, governance and transparency in administration. Through the course modules, the students are exposed to various administrative constructs and practices in India.

The objective of the topic is to familiarize the structure and function of the Local Self-governments in West Bengal and the 73rd and 74th amendment act. To understand the issues of development in the context of shift in polices and subsequent course of public policies and planning at various levels. The course also addresses the impact of different administrative bodies in the development of India.

Paper-SEC-A (3 rd Semester) Title- Democratic awareness through legal literacy

The main objective of this paper is to incorporate to the students to the information on and increase knowledge about the different laws and legal sources which are available to the citizens. Empower students to active use of different laws and make a sense of constructive criticism of the legal process. This study will enhance social awareness about different laws and legal process these can be used through democratic way. This study will also helps to promote consciousness of legal culture, participation in the formation of laws, and rule of laws.

Paper- DSE-A1(5th semester) Title- Understanding South Asia

The socio- economic political issues regarding the countries of South Asia has been major subjects of discussion in recent times. Through this paper it will be highly beneficial for students to get accustomed about the emerging geo-political entities of the region. Thereby Developing awareness about the recent international trends among the students.

Paper-DSE-B2(5th Semester) Title- Indian Foreign Policy in Globalising World

The course presents some important vignettes of a complex, highly diverse India that is also witnessing unprecedented changes since it's formal independence in 1947 from Great Britain. The lecture revolves around social dimensions of the change, the continuing influence of ancient text on contemporary India, political democracy, economic transition from the state to the market, gender relations, India's economic globalization and changing the world view. This paper will be highly beneficial for students to be aware of the socio-political dynamics of contemporary India.

DEPARTMENT OF JOURNALISM & MASS COMMUNICATION

1. PROGRAMME OUTCOME (PO) BACHELOR OF JOURNALISM & MASS COMMUNICATION (B.A. Hons.)

The B.A. in Journalism and Mass Communication course is designed to provide overall and in-depth knowledge about Journalism and Mass Communication to the students. It provides students with an opportunity to critically explore the ways in which world of communications operate in international and national contexts. While the emphasis of the course is on the Subjects of Journalism and Mass Communication but the course also intends to introduce Students to practical experience and knowledge across the other related subjects like corporate social responsibility, film & documentary production, cultural studies and many more. Students also learn the way content is generated for different medium and used in the multi-platform and digitized environment of media industries. They also trained about the new media techniques in order to understand the processes of production, distribution, marketing and consumption.
However the outcome as derived or expected to be derived or acquired the benefits of the program named Bachelor of Journalism & Mass Communication are mentioned below for convenience:

- The course enables students to develop their own focused area of interest. Their work related experiences can potentially lead to a broad spectrum of cultural, media based and artistic activities from interpersonal communication to newspaper, radio & television broadcasting to journalism, digital web production, E-content writing, and public relation, corporate communication to advertising.

- This program provides students with the means to investigate and learn a range of working involving activities from creative production and creation to promotion, marketing and networking. The history, development and research in the media will be analyzed in various contexts. The social values and ethics are in the core of the program.

- The primary and foremost goal of the course is to train the students in such a way so that they can acquire knowledge, skills and leadership quality to contribute in different trades and crafts of all forms of media. As we are committed to bring together concepts and ideas with work 'on the ground', there is significant input from the industry professionals. The course enables students to develop their own focused area of interest.

- Provide comprehensive knowledge and skills so that student can work in the field of Print, Electronic and Digital media as well as in to academics.

- Students are able to do their higher studies and can make research in the field of Journalism, developing communication theories and patterns, film studies, public relation, advertising etc.

Students can pursue the Journalism and Mass Communication course as well as Film Studies and Advertising and PR course at post graduation level like M.A, MBA, M. Phil or post graduation diploma and many more.

Considering all these in depth of B.A in Journalism & Mass Communication program outcome the following conclusion may be drawn on the basis of the opportunities and future prospective available to the students of Journalism & Mass Communication after successful completion of the course –

A. **Employment opportunity**- It provides high employment opportunity as it educates the students regarding production skills in preparation, creation and distribution of content for the designated news media / channels / platforms.

B. **Career prospects**- There are scope for the students to explore themselves after obtaining this degree by looking for career prospects in the interdisciplinary and technical domains of increasing media activity.

C. **Numerous job profile options**- A successful B.A. Journalism & Mass communication student can choose to be any of the following:-

- Reporter in print / Audio – Visual / Digital media
- Special Correspondent
- Photographer
- Film Director
- Camera person
- TV Correspondent
- Program Producer
- News Anchor
- Screenwriter
- Sound Mixer and Sound Recordist
- Editor
- Event manager
- Public Relations Officer

2. SPECIFIC PROGRAM OUTCOME (SPO)

Mass communication is the study of spreading information to a large audience through the various means of communication. Journalism is the activity of writing / presenting about recent developments for newspapers, magazines, radio, television, digital platform etc. Among Journalism & Mass Communication courses students may have mind set in selecting from specialized and specific fields in force under the University of Calcutta such as –

- **Journalist/News reporter –**

  a) An understanding of the roles and duties of journalism in society, and recognition of the legal and more implications of their work.

  b) Students will acquire a functional knowledge of the underlying principles and recent emerging trends of the media industry.

  c) The ability to report in depth, using a wide variety of sources to provide context,

accuracy, and balance.

d) Improving journalistic and research skills through practical work, assignments, project reports, Seminars, and workshops and to acquaint student with advanced journalism and media practices.

- **Anchor / Presenter**

a) Utilizing strong professional aptitude and domain knowledge to develop smart media communication for the betterment of society.

b) Applying research and entrepreneurial skills augmented with a rich set of Communication, teamwork and leadership skills to excel in their profession.

c) Showing continuous improvement in their professional career through life- long learning, appreciating human values and ethics.

d) To fully acquaint students with the need to maintain an even balance between practical, theoretical and conceptual aspects of media professions and lend them a critical understanding of the communication package as a whole.

e) Demonstrate oral delivery competency

- **Film / Documentary**

a) Students are able to develop a broadly interdisciplinary approach to an understanding of film and its role in society

b) Students are able to conversant with the history of international cinema and be able to use that history to provide context for other works they encounter

c) This will make students competent in employing theoretical and disciplinary tools in the analysis and assessment of film and filmic images

d) Students have basic competence in some format associated with visual media - video, music, screenwriting, photography, or animation

e) Students are competent in developing critical responses to cinematic work based upon aesthetic or cultural values other than the entertainment model that dominates the distribution system

- **Content Writer**

a) Utilize context/audience analysis tools and strategies to create context/audience-appropriate rhetoric.

b) Develop a professional commitment to their field, their work, and themselves; preparing them to be members and leaders in their profession, as well as learning how to act both as individuals and as team members to support the whole.

3. COURSE OUTCOME (CO)

A. Print Journalism

- Classifying newspaper as a recorder of news and events, as an organ of public opinion, instrument of social service, and promoter of democracy. The impact of newspaper on society, socioeconomic and cultural development.
- Defining News and understanding its elements, news sources and different types of news.
- Describing the role of the editor-functions and responsibilities and also editorial freedom and the role of the editor in recent perspective. Understanding the role of the news editor and its functions, duties and responsibilities.
- Analyzing the duties and qualities of Chief Sub editor and Sub editors. Identifying the role of the reporter and his/her duties and responsibilities. Various duties, responsibilities & qualities of a chief reporter, foreign correspondent, special correspondent, bureau chief, district correspondent.
- Understanding news writing and different structures of news writing (inverted pyramid structure). Intro, lead and language of news writing, objectivity, writing techniques on society, fashion, music and arts, education, employment opportunities, health, environment and financial reporting. Analyzing crime and legal reporting, science and financial reporting.
- Analyzing feature and different types of features as a special kind of reporting.
- Understanding the importance of editorial and its choice of subjects, arrangement and style of presentation.
- Describing the principles of editing, copy testing, processing copies and computer editing. Describing page make-up, typography, main type groups with recent changes and development.
- Analyzing headlines of news stories and the different types of headlines. The role of computer application.
- Defining Column, its importance and different types, columnists and their qualities
- Understanding photo journalism and its importance, the role of a news photographer, news photo editing, caption writing, photo printing process and dark room processing.
- To introduce students to the history of print media and its role in Indian freedom movement. Various social movements with respect to Indian press.

B. Journalism in Audio-Visual medium

- The basics of Radio and television as a device and as a medium and differentiate between a public and a private broadcaster.
- The technicalities and esthetics of radio and television program and news presentation and production.
- The latest technologies and recent trends in Radio and television Programming and Presentation.

C. Mass Communication & Cultural Studies

- To introduce basic concepts of communication and its role in society, analyzing various processes and theories of communication
- To introduce the students to basics of Culture and its role in society
- To introduce different types of media their characteristics, merits and demerits

- Provide students an understanding of the importance of public opinion and role of journalism in framing it and use of linguistics in it in different era.
- To practice and learn the art of Radio & TV News reporting, making drama, feature, PTC by learning the basic skills and requirement for a radio & TV Journalist

D. Media Management, Advertising & Public Relations

- Examining newspaper as a business enterprise and its public service role with reference to the Indian experience. Various factors associated with ownership of newspapers, the different types of ownership and source of revenue of a newspaper.
- Understanding circulation of newspapers and the various factors involved with circulation of newspapers, newspaper's policy, role of the Circulation department, circulation manager, Audit Bureau of Circulation (ABC).
- Advertisement department of a newspaper, role of the advertisement manager, different types of advertisement in newspapers and newspaper as a medium of advertisement.
- Defining Advertising and its different types. Different advertisement mediums, their selection criterion and relative advantages, ethics of advertising, market research, brand positioning, creative strategy, market and its segmentation and sales promotion.
- Understanding the structure and functioning of an advertising agency and also client agency relationship
- Discussing copy writing with its main features, types and principles of writing. The qualities, duties and responsibilities of a copy writer, copy for electronic media and print media
- Defining public relations with its various aspects, role of the PRO with the qualities and duties, PR in Public and Private Sector, various PR tools, Corporate PR, planning, data collection and editing principles for house journal, PR as a management function, PR institutions, PR and new technology

E. Development Communication, Indian Constitution and Press Laws

- Describing the main features of the Indian Constitution and the fundamental rights, power and position of the President of India, Prime Minister, Chief Minister, Governor, Parliament, Supreme Court and High Court, Local governments; Indian Foreign Policy.
- Analyzing national development policy with the new trends, industrial policy with corporate social responsibility, finance commission and its functions, objectives of the five year plans, objectives of the economic policy and its impact on society
- To introduce students to development issues in India and coverage of media on these issues. To enable to learn the problems of human development and required measures to overcome them.
- Understanding different press laws and acts. Understanding ethics of Journalism, freedom and responsibility of the press, Press Council of India, Media Council of India.

F. Film Studies, Feature and Documentary Production

- Develop a passion for films through understand the language of cinema, film narrative and the history of cinema
- Became professionals with an aesthetic understanding of feature and documentary film production.
- Equipped to approach and appreciate cinema in an academic and technical way. By understanding of the process, students will learn different production stages of feature

and documentary simultaneously. They will acquire knowledge of work flow through pre-production, production and post production stages.

G. Digital Media & Contemporary Journalism

- Student Will understand the importance of digital journalism in the present scenario
- Understand the various aspects of social media, blogging and its use.
- Understand the elements of web designing and writing for this platform
- Learn the importance and application of podcast, webcast as well as various trends of digital media.

DEPARTMENT OF MATHEMATICS

(Program Outcomes and Course Outcomes)

Programme Name: B.Sc (General) in Mathematics

Programme Outcomes:

PO1: Inculcate critical thinking to carry out scientific investigation objectively without being biased withpreconceived notions.

PO2: Enhance the ability to understand both concrete and abstract problems. PO3: Develop analytical thought, logical reasoning and problem solving skills. PO4: Encourage the students to make critical observations
PO5: Empower the ability to accurately organize, analyze and interpret data.

PO6: Develop the mathematical logic which is very useful for solving mathematical reasoning problems. PO7: Prepare students for pursuing research or careers in industry in mathematical sciences and allied fields.
PO8: Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstratehighest standards of ethical issues in mathematical sciences.

Course Outcomes:

Semester I		
Course Code	**Course Name**	**Course Outcomes**
MG(GE1) 101	Mathematics-I	**Unit-1 : Algebra-I** CO1: Gain knowledge about the Exponential, Sine, Cosine and Logarithm of acomplex number. CO2: Acquire a clear knowledge on Polynomial of real coefficients and the natureof the roots. CO3: Implement the methods to determine the number and nature of the rootsof a polynomial. CO4: Develop skills for solving the cubic equations. CO5: Implement different methods to check the consistency and the solution ofa system of linear equations. **Unit-2 : Differential Calculus-I** CO1: Gain a clear concept of limit, continuity and differentiability of a real-valuedfunction of one variable as well as several variables. CO2: Acquire the knowledge on Curvature of plane curves, Rectilinear Asymptotes, Envelope of family of straight lines and of curves and singular points. **Unit-3 : Differential Equation-I** CO1: Gain the concept of Order, degree and solution of an ordinary differentialequation (ODE) and Formation of ODE. CO2: Implement different methods to solve first order ODE as well as secondorder ODE. **Unit-4 : Coordinate Geometry** CO1: Develop skills for Transformations of Rectangular axes. CO2: Provide sufficient knowledge about pair of straight lines, Parabola, Ellipse,Circle, Hyperbola and sphere.

Semestrer II		
Course Code	**Course Name**	**Course Outcomes**
MG(GE2)201	Mathematics-II	**Unit-1 : Differential Calculus-II** CO1: Develop the concept of series and sequence of real numbers. CO2: Implement the concept of maxima and minima for a function of single variable in geometrical, physical and to other problems. **Unit-2 : Differential Equation-II** CO1: Acquire the knowledge to implement different methods to solve Linear homogeneous and non-homogeneous equations with constant coefficients and simultaneous differential equations. CO2: Gain the concept of Partial Differential equations (PDE), its degree and order. CO3: Develop the skills to implement different methods to solve PDE of first order. **Unit-3 : Vector Algebra** CO1: Gain a clear concept of Scaler and Vectors and their properties. CO2: Encourage to implement the concept to solve the problems of Mechanics. **Unit-4 : Discrete Mathematics** CO1: Enhance the knowledge about integers. CO2: Acquire a clear concept of Congruences and Congruence classes. CO3: Develop the idea of Boolean algebra and its applications.

Semest rer III		
Course Code	**Course Name**	**Course Outcomes**
MG(GE3)301	Mathematics-III	**Unit-1 : Integral Calculus** CO1: Learn to evaluate definite integrals. CO2: Gain the concept of improper integrals and their evaluations. CO3: Develop the knowledge of double integrals and its applications in Rectification, Quadrature, volume and surface areas of solids formed byrevolution of plane curve and areas. **Unit-2 : Numerical Methods** CO1: Gain the knowledge of different types of errors while using numericalmethods. CO2: Implement different numerical methods to solve algebraic andtranscendental equations. CO3: Acquire a clear concept of different types of interpolation methods andtheir importance. CO4: Provide sufficient knowledge to solve integrations using differentnumerical methods. **Unit-3 : Linear Programming** CO1: Develop the basic idea of linear programming problems (LPP), itsproperties and its formulation. CO2: Enhance the knowledge of the basic feasible solutions (BFS) of LPP.CO3: Gain the skills to solve LPP. CO4: Provide the idea of Assignment and Transportation problems.

Semestrer IV		
Course Code	**Course Name**	**Course Outcomes**
MG(GE4)401	Mathematics-IV	**Unit-1 : Algebra-II** CO1: Gain a clear concept of the important elements of Abstract algebra likeGroup, Ring and Field. CO2: Enhance the Concept of Vector space over a Field. CO3: Develop the idea of characteristic equations, eigenvalue and eigenvectors. **Unit-2 : Computer Science & Programming** CO1: Develop the basic idea of computer science and programming.CO2: Gain the knowledge of positional number systems. CO3: Acquire a clear concept of different types of programming languages likeBASIC, FORTRAN, C, C++, COBOL, PASCAL, etc. CO4: Enhance the skills to develop Algorithms and Flow Charts– their utilitiesand important features. **Unit-3 : Probability & Statistics** CO1: Develop the basic idea of the important elements of probability theory. CO2: Acquire sufficient knowledge of Theoretical Probability Distribution for Binomial, Poisson and Normal distributions and their properties. CO3: Enhance the concept of the important elements of Statistics.CO4: Gain a clear knowledge of sampling theory. CO5: Understand the concept of Bivariate Frequency Distribution.

Part- III	
Course Name	**Course Outcomes**
Mathematics (General)	**Module- VII :** **Computer Science & Programming** CO1: Develop the basic idea of Boolean algebra. CO2: Gain the knowledge of positional number systems. CO3: Acquire a clear concept of different types of programming languages like BASIC, FORTRAN, C,C++, COBOL, PASCAL, etc. CO4: Enhance the skills to develop Algorithms and Flow Charts– their utilities and importantfeatures. **Module- VIII :** **Calculus** CO1: Gain the concept of series and sequence of real numbers. CO2: Understand the concept of Fourier series. CO3: Enhance the idea of Third and Fourth order ordinary differential equation with constantcoefficients. CO4: Develop the skill to solve second order differential equation and simultaneous differentialequation using different methods. CO5: Acquire the knowledge of Laplace transformation and its applications. CO6: Learn different methods to solve PDE of first order. **Discrete Mathematics** CO1: Enhance the knowledge about integers. CO2: Acquire a clear concept of Congruences and Congruence classes. CO3: Develop the idea of Boolean algebra and its applications.

DEPARTMENT OF PHYSIOLOGY

(BSc General Course)

Programme outcome: Bachelor of Science

1. Developing basic understanding of scientific processes and principles
2. Creating a clear scientific mind and vision towards environment as well as daily life incidents
3. Ability to explain and handle situations in scientific manners and also making a good contribution to the society.

Programme Specific outcome: B.Sc. General in Physiology

1. Students will learn about basic biochemistry and biophysical processes in human systems and importance of digestion, metabolism and molecular biology.
2. Students will learn about blood and body fluids, anomy and mechanism of function of cardiovascular system and also the processes involved in respiratory system.
3. Students will learn about neurones, nervous system and special senses and their mechanism of actions.
4. Students will learn about hormones, different types of glands, mechanism of functions involved in processes involved in reproductive and renal organs.
5. Students will learn about blood related disorders, their causes, prevention and treatments.
6. Students will be able to distinguish, determine and detect additives and adulterants in common foods and also the hazardous effects of these on human and environment.

Course outcome: B.Sc. in Physiology

Semestrer I		
Course Code	**Course Name**	**Course Outcomes**
CC1/GE1	PHYG Thoery +Practical	**Unit-1 : Cellular Basis of Physiology** 1: Understanding the physiology of human systems is important as human are the most developed species on earth till now. 2: Students will able to understand the structures of each cell organelle and explain their functions inside a cell and its overall functionality in respect to whole body system. Unit-2 : Biophysical Principles, Enzymes and Chemistry of Bio-molecules 1. Interpret and understand simple physical processes like diffusion and osmosis and also complex processes like ultrafiltration and pH balance and their importance in a living cell. 2. Understand some fascinating features like colloids and enzymes. 3. Gain knowledge about most important chemicals- carbohydrates, proteins and fats. They will be able to understand their structural and functional relationship, classify them based on many features and bond formation at molecular level and most importantly their physiological importance in a living cell. 4. Understand structure and functions of DNA and RNA and differentiate between them. **Unit-3 : Digestion & Metabolism** Students will be able to understand and interpret all these procedures and also:

		1. Understand the structures and functions of the digestive organs and their specific functions related to different types of foods. 2. will be able to know the functions and classify different digestive enzymes 3. will be able to differentiate between extra- and intra-cellular enzymes 4. gather knowledge about most important process involved in energy production 5. Understand energy metabolism. **Unit-4 : CC1/GE1 Practical** Practical and Demonstration classes provide a careerist approach for the students. i) Students will be able to identify and distinguish between different epithelial cells in normal human body. ii) They will be able to identify some known and unknown bio-molecules which are most important in a living cell. iii) they will be able to measure percentage and total quantity of some specific bio-molecules by titration method.

Semestrer II		
Course Code	**Course Name**	**Course Outcomes**
CC2/GE2	PHYG Thoery +Practical	**Unit-1 :** Blood and Body fluids: All the blood components are very important in detection of vast array of diseases as their characteristics change with every known disease. Students will learn about all these compositions and functions of all important body fluids, physiology of blood related diseases and their preventions. **Unit-2 :** Cardiovascular System: Students will learn about all the structures and functions of heart, cardiac regulatory factors, blood pressure and blood circulation. **Unit-3 :** Respiratory System: Students will learn about all these structures, mechanical and physiological functions of lungs and respiratory air passages and related diseases. **Unit-4 : CC2/GE2 Practical:** i) Students will be able to identify blood cells in normal as well as different diseased and medico-legal conditions. ii) They will be able to understand mechanical changes of heart rhythm in response to temperature. iii) They will be able to measure blood pressure and interpret low or high B.P. iv) They will be able to measure lung functions in different physiological conditions and interpret normal and abnormal lung conditions.

Semestrer III		
Course Code	**Course Name**	**Course Outcomes**
CC3/GE3	PHYG Thoery +Practical	**Unit-1 : Nerve-muscle Physiology** 1. Understand the extraordinary structure and functions of the neuro-muscular syatem. 2. Distinguish between different types of neurones and muscles and how these different features are important for their respective functions. 3. coordination between functions of the neurone and muscle. 4. role of different cataions and anaions in generation of nerve impulse and its conduction throughout body. 5. Understand the generation of electrical, chemical and mechanical impulse and how these are most important for a living system. **Unit-2 : Nervous System:** students will: 1. Understand the complicated structure of the nervous system, its organizations and functions 2. Be able to distinguish between sensory and motor signals, their coordination through rflex actions and also learn about the neuronal pathways/tracts carrying these signals throughout our body. 3. The structure and functions of the brain and spinal cord. And their functions regarding conditioned and unconditioned reflrex. 4. Understand the functions of different brain areas regarding Learning, Memory, Emotions, Intellegence, Motor control, Thinking, Sleep, Body temperature maintenance, Body balance and Kinaesthetic coordination and many more. **Unit-3 : Special Senses:** students will 1. Understand structure and specific functions of these special organs. 2. Be able to distinguish between different neuronal organizations involved in different special sensory mechanism. 3. Understand mechanism of special sensory adaptations. 4. Have elementary idea about vision, light and darkness and mechanism of image formation through eye. 5. Learn about some common visual errors. **Unit-4 : CC3/GE3 Practical:** i) Students will be able to the Nodes of Ranvier located in myelinated neuones. ii) They will be able to identify cell spaces in cornea in eye. iii) They will be able to distinguish different features between cardiac and skeletal

		muscles when examined under microscope.
Semestrer IV		
Course Code	**Course Name**	**Course Outcomes**
CC4/GE4	PHYG Thoery +Practical	**Unit-1 : Endocrinology:** Students will be able to understand- 1. location, basic anatomy and functions of endocrine glands in human body 2. Functions and Classification of hormones 3. Molecular mechanism of hormone actions 4. Hormone-related diseases **Unit-2 : Reproductive Physiology:** Students will 1. Have a basic idea about sex organs, their anatomy, molecular structure in male and female human beings 2. learn about gametogenesis and their hormonal control 3. be able to understand the complex mechanism of pregnancy and lactation. **Unit-3 : Excretory Physiology:** Students will be able to understand- 1. Structure and functions of kidney 2. Excretory and non-excretory functions of kidney 3. Structure and functions of skin 4. how body temperature in maintained in human beings **Unit-4: CC4/GE4 Practical:** 1. Students will be able to identify the histology of different mammalian tissues under microscope 2. Students will be able to perform biochemical tests to identify normal and abnormal constituents of urine.

Department of Botany

Course Outcomes:

Botany covers a wide range of scientific disciplines concerned with the study of plants, alage and fungi, including structure, growth, reproduction, metabolism, development, diseases, chemical properties and evolutionary relationships among taxonomic groups. The course structure of this course is designed while keeping in mind the market demand for skilled and efficient professional who can effectively cater to the demands of growing botanical industry. Job opportunities are also wide as research organisations, herbal products companies, farm management organizations; biotechnology firms always require the services of botany students. After the degree course, botany students can work in the state departments, botanical survey of India and environmental protection agency. The department aims to provide the students an up to date level of understanding of plant science and allows them to develop an aptitude towards science and nature. Along with it the students are equipped with the basic skills in identifying and labelling different plants.

A holistic development and academic excellence to contribute effectively to the understanding of the subject along with sensitizing the students towards the need for keeping the environment clean and conserve

our natural resources is the prime motive of the department.

Semester I	**Course: Phycology and microbiology, mycology and phytopathology** The course aims at making the students understand the diversity among algae, fungi,. The course is designed to familiarize the students with microbes and cryptogams. The students will know the
Semester II	**Course: plant anatomy and archegoniatae** The student can understand the internal structure, about stele, leaf gap,secondary growth. The students can also understand the different plant groups in archegoniates

Semester III	**Course Paleobotany ,reproductive biology of angiosperm and plant systematic**The course is an introduction to the methodology and principles of plant systematics and patterns and origin of seed plant diversity. Lectures and practicals provide skills needed to recognise and characterise several plant families and higher taxa that are important elements of ecosystem. The students are made to understand the key methods and principles of biological classification and nomenclature. Apart from this, students also get an idea about the major patterns and
Semester IV	**Course: plant geography, Ecology,and evolution** This course deals with various processes of plants like photosynthesis (particular emphasis on light and dark reactions), respiration, translocation, absorption and nitrogen metabolism. The students also get an insight into the various types of plant movements.
Semester V	**Course: Cell Biology and Genetics** The objective of this course is to have an insight into mechanism of gene expression and its regulation in prokaryotes and eukaryotes. This course helps the students to develop a firm foundation in the fundamentals of cell biology and cytogenetics.

Semester VI	**Course: Plant physiology and plant metabolism** This course deals with various processes of plants like photosynthesis (particular emphasis on light and dark reactions), respiration, translocation, absorption and nitrogen metabolism. The students also get an insight into the various types of plant movements.

DEPARTMENT OF ZOOLOGY

PROGRAMME OUTCOME

Zoology as core course / generic elective

Zoology is the study of 'Animals' which includes scientific learning of the evolution, anatomy, physiology, behavior, habitats, and health of animals. It is encompassing of both theoretical and practical approaches where academic knowledge is further replenished with field visits with ecological importance.

By studying animals, a better understanding can be developed of about how they interact with the world around them and how could one be able to affect this interaction by bringing changes, empowering better choices, and developing solutions for constructing a more trustworthy world for them. During the entire course, a student having Zoology can be able to realize the importance of - Nature and its resources, conservation of the co-existing harmony between animals and their ecosystems. Study of anatomy, morphology, physiology and behavior of animals enables them to identify the animal fauna at vivid location. Analysis of genetic pattern and molecular architecture of cellular structures may encourage them to microscopic studies and related interpretation of various outcomes. While studying applied zoology, a student could be able to analyze the impact of agricultural pest population on crop destruction and growth. Besides, nature and mode of transmission of zoonotic diseases, parasitic diseases, vector mediate diseases etc. - are the areas where they again demonstrate expertize.

Field visit is an integral part of Zoology study and the budding zoologists may find themselves into a new horizon at these trips. They have got the opportunities to interact with local environment, flora and fauna of the area, local people and their livelihood, culture and attitude towards the nature. Thus theoretical knowledge and practical demonstrations in the classrooms get blended into these educational excursions and helps the students to realize their actual roles as they are, in true sense, a'caretaker of Mother Nature'.

Zoology as DSE

In this course work, specified sectors of the mother subject Zoology is enlisted like – Parasitology, Biology of insects, Endocrinology, Reproductive biology, Animal cell biotechnology, Animal biotechnology, Animal behavior and chronobiology and Fish and fisheries and the students are allowed to choose them according to their likings. Study of these specialized fields may boost up their further knowledge as the short listed topics are beneficial for their future prospects. They can be established themselves a 'specialist' in these fields and achieved admirable positions in society.

Zoology as SEC

As skill enhancement course two specified programs are offered to the students– Apiculture and Sericulture both have enormous impact on employment generation and economic output. Over the years, honey and silk, product of api-and sericulture respectively are an important part of human lives and society. These substances are extracted from animals and the proper management of this cultural practice is only possible after thorough knowledge which may improve the skills of the present students as future entrepreneur in the sector of Apiculture and Sericulture.

Outcome analysis

While analyzing about the outcome of the future of the students having Zoology as their subject it should be remembered that one may not be an expert in the field, but possessing knowledge about the subject will always prove to be beneficial.

After completion of the graduate degree with Zoology as core subject some students choose to undertake postgraduate study at Masters or PhD level in order to specialize in a particular area of interest within their discipline which in turn, paves their way towards establishing themselves in Rand D sections and in academic areas. Besides, various management sectors like wildlife conservation, environmental sustainability program, ecology and management of the natural environmentetc also hold strong positions for students with Zoology background.

Both graduate and post graduate students of Zoology may establish themselvesin various public and private sectors along with scientific and academic arena. They may start their carrier as Forest officer, Animal behaviorist, Environmental consultant, Zoo Curator, Wildlife Educator, Field trial officer, Forensic experts, Lab technicians, Veterinarians, Science writer etc. Thus Zoology as a subject may offer diverse approaches wherefrom students can pick up many suitable options for their bright future.

ZOOLOGY HONOURS

COURSE SPECIFIC OUTCOME

PART I: SEMESTER 1

CORE COURSE 1. Non-Chordates I

ZOOA-CC1-1-TH

COURSE NAME	COURSE OUTCOME
Unit 1: Basics of Animal Classification	The students will get overall idea and comprehensive overview about Definitions, Classification, Systematics and Taxonomy; Taxonomic Hierarchy, Taxonomic types,Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy; Concept of classification – three kingdom concept of Carl Woese, 1977 and five kingdom concept of Whittaker, 1969.
Unit 2: Protista and Metazoa	The students will get overall idea and comprehensive overview about General characteristics and Classification up to phylum. Locomotion in *Euglena*, *Paramoecium*and *Amoeba*; Conjugation in *Paramoecium*. Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica.* Evolution of symmetry and segmentation of Metazoa.

Unit 3: Porifera	Students will gain knowledge and a clear idea aboutGeneral characteristics and Classification up to classes; Canal system and spicules in sponges
Unit 4: Cnidaria	The students will get overall idea and comprehensive overview about General characteristics and Classification up to classes, Metagenesis in *Obelia*; Polymorphism in Cnidaria; Corals and coral reef diversity, Role of symbiotic algae in reef formation. Conservation of coral and coral reefs.
Unit 5: Ctenophora	The students will get overall idea and comprehensive overview about General characteristics of ctenophore.
Unit 6: Platyhelminthes	Students will gain knowledge and a clear idea aboutGeneral characteristics and Classification up to classes (Ruppert and Barnes, 1994, 6th Ed.) Life cycle and pathogenicity and control measures of *Fasciola hepatica* and *Taeniasolium.*
Unit 7: Nematoda	Students will gain knowledge and a clear idea aboutGeneral characteristics and Classification up to classes (Ruppert and Barnes, 1994, 6th Ed.) Life cycle, and pathogenicity and control.measures of *Ascaris lumbricoides*and *Wuchereriabancrofti* Parasitic adaptations in helminthes.

ZOOA-CC-1-1-P

COURSE NAME	**COURSE OUTCOME**
Study of whole mount of *Euglena*, *Amoeba* and *Paramoecium.*	By practical demonstration students will get idea about mounting of protozoa.
Identification with reason	By practical demonstration students will identify different types of non-chordate organisms.
Staining/mounting of any protozoa/helminth from gut of *Periplaneta*sp.	Students will get idea about staining of protozoa from gut of Periplaneta sp. by practical demonstration.

CORE COURSE 2: Molecular Biology

ZOOA-CC1-2-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: Nucleic Acids	Students will gain knowledge and a clear idea aboutSalient features of DNA, Chargaff's Rule, Hypo and Hyperchromic shift. Watson and Crick

	Model of DNA. RNA types & Function.
Unit 2: DNA Replication	The students will get overall idea and comprehensive overview about Mechanism of DNA Replication in Prokaryotes, Prove that replication is Semi-conservative, bidirectional and discontinuous, RNA priming, Replication of telomeres.
Unit 3: Transcription	Students will gain knowledge and a clear idea aboutMechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.
Unit 4: Translation	The students will get overall idea and comprehensive overview about Genetic code, Degeneracy of the genetic code and Wobble Hypothesis. Mechanism of protein synthesis in prokaryotes.
Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA	Students will gain knowledge and a clear idea aboutCapping and Poly A tail formation in mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing and RNA editing
Unit 6: Gene Regulation	Students will gain knowledge and a clear idea aboutRegulation of Transcription in prokaryotes: *lac* operon and *trp*operon; Regulation of Transcription in eukaryotes: Activators, enhancers, silencer, repressors, miRNA mediated gene silencing. Epigenetic Regulation: DNA Methylation, Histone Methylation & Acetylation.
Unit 7: DNA Repair Mechanisms	The students will get overall idea and comprehensive overview about Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair.
Unit 8: Molecular Techniques	The students will get overall idea and comprehensive overview about PCR, Western and Southern blot, Northern Blot.

ZOOA-CC-1-2-P

COURSE NAME	**COURSE OUTCOME**

Demonstration of polytene and lampbrush chromosome from photograph.	By practical demonstration students will get idea aboutpolytene and lampbrush chromosome.
Isolation and quantification of genomic DNA from goat liver	By practical demonstration students will get idea about DNA isolation.
Agarose gel electrophoresis for DNA	By practical demonstration students will get idea about Agarose gel electrophoresis.
Histological staining of DNA and RNA in prepared slides	By practical demonstration students will get idea about histological staining of DNA and RNA.

PART I: SEMESTER 2

CORE COURSE 3: Non-Chordates II – Coelomates

ZOOA-CC2-3-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: Introduction	The students will get overall idea and comprehensive overview about the concept of Evolution of coelom.
Unit 2: Annelida	The students will get overall idea and comprehensive overview about General characteristics and Classification of annelida; Excretion in Annelida through nephridia; Metamerism in Annelida.
Unit 3: Arthropoda	Students will gain knowledge and a clear idea about General characteristics and Classification of arthropods; Insect Eye (Cockroach only). Respiration in Prawn and Cockroach; Metamorphosis in Lepidopteran Insects; Social life in Termite.
Unit 4: Onychophora	The students will get overall idea and comprehensive overview about theGeneral characteristics and Evolutionary significance.
Unit 5: Mollusca	Students will gain knowledge and a clear idea about General characteristics and Classification of molluscs; Nervous system in Pila sp. Torsion in Gastropoda. Feeding and respiration in Pila sp.
Unit 6: Echinodermata	Students will gain knowledge and a clear idea about General characteristics and Classification of echinoderms; Watervascular system in Asterias. Echinoderm larva and affinities with chordates
Unit 7: Hemichordata	The students will get overall idea and comprehensive overview about General characteristics of phylum Hemichordata.

	Relationship with non-chordates and chordates

ZOOA-CC-2-3-P

COURSE NAME	**COURSE OUTCOME**
1. Study of specimens: Annelida, Arthropoda, Mollusca, Echinoderms.	The students will get overall idea and comprehensive overview about the specimens by practical demonstration.
2. Anatomy study	The students will get overall idea and comprehensive overview aboutNervours system, Reproductive system (Male & female), Mouth parts & Salivary apparatus in *Periplaneta* sp. by practical demonstration.

CORE COURSE 4: Cell Biology
ZOOA-CC2-4-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: Plasma Membrane	Students will gain knowledge and a clear idea about Ultra-structure and composition of Plasma membrane: Fluid mosaic model, Transport across membrane - Active and Passive transport, Facilitated transport, Cell junctions: Tight junctions, Gap junctions, Desmosomes.
Unit 2: Cytoplasmic organelles I	The students will get overall idea and comprehensive overview aboutStructure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes; Protein sorting and mechanisms of vesicular transport.
Unit 3: Cytoplasmic organelles II	The students will get overall idea and comprehensive overview aboutMitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis Mitochondrial Respiratory Chain, Chemiosmotic hypothesis; Peroxisomes: Structure and Functions Centrosome (Kinetochore and centromeric DNA): Structure and Functions.
Unit 4: Cytoskeleton	Students will gain knowledge and a clear idea about Type, structure and functions of cytoskeleton; Accessory proteins of microfilament & microtubule.
Unit 5: Nucleus	The students will get overall idea and comprehensive overview aboutNuclear envelope, Nuclear pore complex, Nucleolus; Chromatin: Euchromatin and Heterochromatin and packaging (nucleosome).
Unit 6: Cell Cycle	Students will gain knowledge and a clear idea about Cell cycle and its regulation, Cancer (Concept of oncogenes and tumor suppressor genes with

	special -reference to p53, Retinoblastoma and Ras. Process of Proto-oncogene activation.
Unit 7: Cell Signalling	The students will get overall idea and comprehensive overview aboutCell signalling transduction pathways; Types of signalling molecules and receptors (Classification and Example only): RTK & JAK/STAT. Apoptosis.

ZOOA-CC-2-4-P

COURSE NAME	**COURSE OUTCOME**
study various stages of mitosis	The students will get practical idea aboutpreparation of temporary stained squash of onion/arum root tip to study various stages of mitosis.
Study of various stages of meiosis	Study of various stages of meiosis from grasshopper testis by practical demonstration.
Preparation of permanent slide of Barr body	The students will get practical idea aboutpreparation of permanent slide of Barr body in human female blood cells/cheek cells.
Preparation of permanent slide to demonstrate	Students will get idea about DNA by Feulgen reaction and Cell viability study by Trypan Blue staining.

PART II: SEMESTER 3.
CORE COURSE 5 : Chordata

ZOOA-CC3-5-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: **Introduction to Chordates**	Students will gain knowledge and a clear idea about General characteristics and outline classification of Phylum Chordata
Unit 2: **Protochordata**	The students will get overall idea and comprehensive overview about General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Metamorphosis in *Ascidia*. Chordate Features, structure of pharynx and feeding in *Branchiostoma*
Unit 3: **Agnatha**	The students will get overall idea and comprehensive overview about General characteristics and classification of cyclostomes up to order
Unit 4: **Pisces**	The Students will gain knowledge and a clear idea about General characteristics and classification up to living sub classes ; Accessory respiratory organ, Migration in fishes; Parental care in fishes; Swim bladder

	in fishes.
Unit 5: **Amphibia**	The students will get overall idea and comprehensive overview about General characteristics and classification up to living Orders; Metamorphosis, Paedomorphosis, Parental care in Amphibia
Unit 6: **Reptilia**	The Students will gain knowledge and a clear idea about General characteristics and classification up to living Orders ; Poison apparatus and Biting mechanism in Snake. Poisonous & Non-Poisonous snake.
Unit 7: **Aves**	The students will get overall idea and comprehensive overview about General characteristics and classification up to living Sub-Classes; Exoskeleton and migration in Birds; Principles and aerodynamics of flight
Unit 8 :- **Mammals**	The students will get overall idea and comprehensive overview about General characters and classification up to living sub classes; Exoskeleton derivatives of mammals; Adaptive radiation in mammals with reference to locomotory appendages; Echolocation in Micro chiropterans.

ZOOA-CC-3-5-P

COURSE NAME	**COURSE OUTCOME**
Identification with reasons	The students will get practical idea about *a)* **Protochordata**: *Balanoglossus, Branchiostoma* *b)* **Agnatha**: *Petromyzon* *c)* **Fishes**: *Scoliodon, Sphyrna, Pristis, Torpedo, Mystus, Heteropneustes, Labeorohita, Exocoetus, Hippocampus, Anabas,* Flat fish d) **Amphibia**: *Necturus, Bufo (Duttaphrynus) melanostictus, Rana (Hoplobatrachus) tigerinus, Hyla, Tylototriton,* Axolotl larva *e)* **Reptilia**: Chelone, Trionyx, Hemidactylus, Varanus, *Calotes*, *Chamaeleon, Draco, Vipera, Naja, Hydrophis,* f) **Mammalia**: Bat (Insectivorous and Frugivorous), *Funambulus*(Indian Palm squirrel)
Dissection of Brain and Pituitary	The students will get practical idea about *ex situ,* digestive and Urino-genital system of *Tilapia* Pecten from Fowl head
Power Point Presentation	The students will get practical idea about the study of habit, habitat or behaviour of any one animal

CORE COURSE 6: Animal Physiology: Controlling and Coordinating System

ZOOA-CC3-6-TH

COURSE NAME	COURSE OUTCOME
Unit 1: **Tissues**	The Students will gain knowledge and a clear idea about Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue
Unit 2: **Bone and Cartilage**	The students will get overall idea and comprehensive overview about Structure and types of bones and cartilages, Ossification
Unit 3: **Nervous System**	The students will get overall idea and comprehensive overview about Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and non-myelinated nerve fibres; Types of synapse, Synaptic transmission and Neuromuscular junction
Unit 4: **Muscular system**	The Students will gain knowledge and a clear idea about Histology of different types of muscle; Ultra-structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle fibre
Unit 5: **Reproductive System**	The students will get overall idea and comprehensive overview about Histology of mammalian testis and ovary; physiology of mammalian reproduction – menstrual and oestrous cycle
Unit 6: **Endocrine System**	The Students will gain knowledge and a clear idea about Histology and function of thyroid, pancreas and adrenal. Function of pituitary Classification of hormones; Mechanism of Hormone action; Signal transduction pathways for Steroidal and Non- steroidal hormones; Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary; Placental hormones

ZOOA-CC3-6-P

COURSE NAME	COURSE OUTCOME
Muscular System	The students will get practical idea about Recording of cardiac and simple muscle twitch with electrical stimulation
Preparation of temporary mounts	The students will get practical idea about the Squamous epithelium, Striated muscle fibres and nerve cells.
Study of permanent slides	The students will get practical idea about permanent slides of Mammalian Skin, Spinal cord, Pancreas, Testis, Ovary, Adrenal, Lung, pyloric stomach, cardiac stomach, Thyroid, small intestine and large intestine of mammal (white rat)
Microtomy	The students will get practical idea about Preparation of permanent slide of any five mammalian (Goat/white rat) tissues

CORE COURSE 7: Fundamentals of Biochemistry
ZOOA-CC3-7-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: **Carbohydrates**	The Students will gain knowledge and a clear idea Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of Monosaccharides; Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis
Unit 2: **Lipids**	The students will get overall idea and comprehensive overview about Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Triacylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpinoids. Lipid metabolism: β-oxidation of fatty acids - a. Palmitic acid {saturated (C 16:0)}, b. Linoleic acid {unsaturated (C 18:2)}; Fatty acid biosynthesis
Unit 3: **Proteins**	The students will get overall idea and comprehensive overview about Amino acids: Structure, Classification, General and Electro chemical properties of α-amino acids; Physiological importance of essential and non-essential amino acids, Proteins Bonds stabilizing protein structure; Levels of organization; Protein metabolism: Transamination, Deamination, Urea cycle, Fate of C-skeleton of Glucogenic and Ketogenic amino acids
Unit 4: **Nucleic Acids**	The Students will gain knowledge and a clear idea about Structure of Purines, Pyrimidines, Nucleosides and Nucleotides; Nucleic Acid Metabolism: Catabolism of adenosine, Guanosine, cytosine and thymine.
Unit 5: **Enzymes**	The students will get overall idea and comprehensive overview about Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Derivation of Michaelis-Menten equation, Lineweaver-Burk plot; Factors affecting rate of enzyme-catalyzed reactions; Enzyme inhibition.
Unit 6: **Oxidative Phosphorylation**	The Students will gain knowledge and a clear idea about Redox systems; Mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System

ZOOA-CC-3-7-P

COURSE NAME	COURSE OUTCOME
Qualitative test	The students will get practical idea about the Qualitative tests for carbohydrates, proteins and lipids.
Qualitative estimation	The students will get practical idea about the Qualitative estimation of Urea & Uric acid
Paper chromatography	The students will get practical idea about the Paper chromatography of amino acids.
Quantitative estimation	The students will get practical idea about the Quantitative estimation of water soluble proteins following Lowry Method

SEC-1 Apiculture

ZOOA-SEC(A)-3-1-TH

COURSE NAME	COURSE OUTCOME
Unit 1: Biology of Bees	The Students will gain knowledge and a clear idea about *Apis*and Non-*Apis*Bee species and their identification. General Morphology of *Apis*Honey Bees Social Organization of Bee Colony
Unit 2: Rearing of Bees	The students will get overall idea and comprehensive overview about Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth box Bee Pasturage Selection of Bee Species for Apiculture Modern Bee Keeping Equipment Methods of Extraction of Honey (Indigenous and Modern)
Unit 3: Diseases and Enemies	The Students will gain knowledge and a clear idea about Bee Diseases and Enemies Control and Preventive measures
Unit 4: Bee Economy	The Students will gain knowledge and a clear idea about Products of Apiculture Industry and its Uses – Honey, Bees Wax, Propolis, Pollen etc.
Unit 5: Entrepreneurship in Apiculture	The students will get overall idea and comprehensive overview about Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens.

PART II: SEMESTER 4
CORE COURSE 8.Comparative Anatomy of Vertebrates
ZOOA-CC4-8-TH

COURSE NAME	COURSE OUTCOME
Unit 1: Integumentary System	The students will get overall idea and comprehensive overview about Structure, function and derivatives of integument in amphibian, birds and mammals
Unit 2: Digestive System	The students will get overall idea and comprehensive overview about Comparative anatomy of stomach; dentition in mammals
Unit 3: Respiratory System	The Students will gain knowledge and a clear idea about Respiratory organs in fish, birds and mammals
Unit 4: Circulatory System	The students will get overall idea and comprehensive overview about General plan of circulation, Comparative account of heart and aortic arches
Unit 5: Urinogenital System	The Students will gain knowledge and a clear idea about Succession of kidney in different vertebrate groups; evolution of urino-genital ducts
Unit 6: Nervous system and sense organs	The Students will gain knowledge and a clear idea about Comparative account of brain in vertebrates; cranial nerves; olfactory and auditory receptors in Vertebrates
Unit 7: Skeletal system	The students will get overall idea and comprehensive overview about Overview of axial and appendicular skeleton – limbs, girdles of pigeon; jaw suspension in Mammals

ZOOA-CC4-8-P

COURSE NAME	COURSE OUTCOME
Study of placoid, cycloid and ctenoid scales	Study of placoid, cycloid and ctenoid scales through permanent slides/photographs
Study of disarticulated skeleton	Study of disarticulated skeleton of toad, Pigeon, Guineapig (limb bones, vertebrae, limb and girdle)
Comparative study of heart and brain	Comparative study of heart and brain, with the help of model/picture
Identification of skulls	Identification of skulls: Pigeon, one herbivore (Guineapig) and one carnivore (Dog) animal

CORE COURSE 9: Animal Physiology: Life Sustaining Systems

ZOOA-CC4-9-TH

COURSE NAME	COURSE OUTCOME
Unit 1: Physiology of Digestion	The Students will gain knowledge and a clear idea about Structural organisation and function of gastro-intestinal tract; Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids and Proteins in Human
Unit 2: Physiology of Respiration	The Students will gain knowledge and a clear idea about Mechanism of Respiration, Respiratory volumes and capacities, transport of Oxygen and Carbon dioxide in blood, Dissociation curves and the factors influencing it, respiratory pigments; Carbon monoxide poisoning
Unit 3: Physiology of Circulation	The students will get overall idea and comprehensive overview about Structure and functions of haemoglobin; Blood clotting system; Haematopoiesis; Basic steps and its regulation; Blood groups; ABO and Rh factor.
Unit 4: Physiology of Heart	The students will get overall idea and comprehensive overview about Coronary Circulation, Structure and working of conducting myocardial fibres, Origin and conduction of cardiac impulses; Cardiac Cycle and cardiac output.
Unit 5: Thermoregulation & Osmoregulation	The students will get overall idea and comprehensive overview about Thermal regulation in camel and polar bear, Osmoregulation in aquatic vertebrates.
Unit 6: Renal Physiology	The Students will gain knowledge and a clear idea about Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acidbase balance.

ZOOA-CC4-9-P

COURSE NAME	COURSE OUTCOME
Determination of ABO Blood group	The students will get practical idea about ABO Blood group
Estimation of haemoglobin using Sahli's haemoglobin meter	The students will get practical idea about haemoglobin meter
Identification of blood cells from human blood	The students will get practical idea about human blood
Preparation of haemin crystals and haemochromogen crystals	The students will get practical idea about haemin crystals and haemochromogen crystals
Identification of blood cells from cockroach haemolymph	The students will get practical idea about haemolymph

Demonstration of blood pressure by digital meter	The students will get practical idea about blood pressure by digital meter

CORE COURSE 10: Immunology
ZOOA-CC4-10-TH

COURSE NAME	COURSE OUTCOME
Unit 1: Overview of Immune System	The students will get overall idea and comprehensive overview about Introduction – concept of health and disease; Cells and organs of the Immune system.
Unit 2: Innate and Adaptive Immunity	The students will get overall idea and comprehensive overview about Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral).
Unit 3: Antigens	The students will get overall idea and comprehensive overview about Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes
Unit 4: Immunoglobulins	The Students will gain knowledge and a clear idea about Structure and functions of different classes of immunoglobulins, Antigen-antibody interactions, Immunoassays (ELISA and RIA), Monoclonal antibody production
Unit 5: Major Histocompatibility Complex	The Students will gain knowledge and a clear idea about Structure and functions of MHC molecules. Structure of T cell Receptor and its signalling, T cell development & selection
Unit 6: Cytokines	The students will get overall idea and comprehensive overview about Types, properties and functions of cytokines.
Unit 7: Complement System	The students will get overall idea and comprehensive overview about Components and pathways of complement activation.
Unit 8: Hypersensitivity	The Students will gain knowledge and a clear idea about Gell and Coombs' classification and brief description of various types of hypersensitivities.
Unit 9: Vaccines	The students will get overall idea and

	comprehensive overview about Various types of vaccines. Active & passive immunization (Artificial and natural).

ZOOA-CC4-10-P

COURSE NAME	COURSE OUTCOME
Demonstration of lymphoid organs	The students will get overall idea and comprehensive overview aboutlymphoid organs
Histological study of Bursa fabricius, spleen, thymus and lymph nodes through slides/ Photographs	The students will get overall idea and comprehensive overview aboutBursa fabricius, spleen, thymus and lymph nodes.
Demonstration of ELISA	The students will get overall idea and comprehensive overview aboutELISA

SEC-1.Aquarium Fish Keeping
ZOOA-SEC(B)-4-1-TH

COURSE NAME	COURSE OUTCOME
Unit 1: Introduction to Aquarium Fish Keeping	The Students will gain knowledge and a clear idea about The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes
Unit 2: Biology of Aquarium Fishes	The students will get overall idea and comprehensive overview about Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish
Unit 3: Food and feeding of Aquarium fishes	The students will get overall idea and comprehensive overview about Use of live fish feed organisms. Preparation and composition of formulated fish feeds, Aquarium fish as larval predator
Unit 4: Fish Transportation	The Students will gain knowledge and a clear idea about Live fish transport - Fish handling, packing and forwarding techniques.
Unit 5: Maintenance of Aquarium	The Students will gain knowledge and a clear idea about General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry.

PART III: SEMESTER 5
CORE COURSE 11.Ecology
ZOOA-CC5-11-TH

COURSE NAME	COURSE OUTCOME
Unit 1: Introduction to Ecology	The students will get overall idea and comprehensive overview about Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere.
Unit 2: Population	The Students will gain knowledge and a clear idea about Unitary and Modular populations Unique and group attributes of population: Demographic factors, life tables, fecundity tables, survivorship curves, dispersal and dispersion. Geometric, exponential and logistic growth, equation and patterns, r and K strategies Population regulation – densitydependent and independent factors, Population Interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition.
Unit 3: Community	The students will get overall idea and comprehensive overview about Community characteristics: species diversity, abundance, dominance, richness, Vertical stratification, Ecotone and edge effect; Ecological succession with one example.
Unit 4: Ecosystem	The Students will gain knowledge and a clear idea about Types of ecosystem with an example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow, Ecological pyramids and Ecological efficiencies; Nitrogen cycle.
Unit 5: Applied Ecology	The Students will gain knowledge and a clear idea about Types & level of biodiversity Mega-diversity countries, Biodiversity Hot spot, Flagship species, Keystone species, Wildlife Conservation (*in situ* and *ex situ* conservation), concept of protected areas. Red data book, Indian wild life act & Schedule. Concept of corridor, advantages and problem of corridor.Threats to survival and conservation strategies for Tiger, Olive ridley, White Rumped Vulture.

ZOOA-CC5-11-P

COURSE NAME	COURSE OUTCOME
Determination of population density	The students will get overall idea and comprehensive overview aboutDetermination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community.
Study of an aquatic ecosystem	The students will get overall idea and comprehensive overview about an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, salinity, determination of pH, and Dissolved Oxygen content

	(Winkler's method), Chemical Oxygen Demand and free CO2.
Report on a visit to National Park/Biodiversity Park/Wild life sanctuary/ any place of ecological interest/ ecological uniqueness/ Zoological garden	The students will get overall idea and comprehensive overview about excursion and field study.

CORE COURSE 12.Principle of Genetics
ZOOA-CC5-12-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: Mendelian Genetics and its Extension	The students will get overall idea and comprehensive overview about Principles of inheritance, Incomplete dominance and co-dominance, Epistasis, Multiple alleles, Isoallele (White eye mutations), Pseudoallele (Lozenge Locus) & Cis-trans test for allelism, Lethal alleles, Pleiotropy, Penetrance & Expressivity
Unit 2: Linkage, Crossing Over and Linkage Mapping	The Students will gain knowledge and a clear idea about Linkage and Crossing, Complete & Incomplete Linkage, Measuring Recombination frequency and linkage map construction using three factor crosses, Interference and coincidence Sex linkage in *Drosophila* (White eye locus) & Human (Haemophilia).
Unit 3: Mutations	The Students will gain knowledge and a clear idea about Types of gene mutations (Classification), Types of chromosomal aberrations (Classification with one suitable example from *Drosophila* and Human of each), variation in chromosome number; Nondisjunction of X chromosome in *Drosophila*; Non-disjunction of Human Chromosome 21. Molecular basis of mutations in relation to UV light and chemical mutagens. Mutation detection in *Drosophila*by attached X method. Biochemical mutation detection in *Neurospora*.
Unit 4: Sex Determination	The students will get overall idea and comprehensive overview about Mechanisms of sex determination in *Drosophila* and in man; Dosage compensation in *Drosophila* & Human

Unit 5: Extra-chromosomal Inheritance	The students will get overall idea and comprehensive overview about Kappa particle in *Paramoecium,* Shell spiralling in snail
Unit 6: Genetic Fine Structure	The Students will gain knowledge and a clear idea about Complementation test in Bacteriophage (Benzer's experiment on rII locus)
Unit 7: Transposable Genetic Elements	The Students will gain knowledge and a clear idea about IS element in bacteria, Ac-Ds elements in maize and P elements in *Drosophila,* LINE, SINE, Alu elements in humans.

ZooA-CC5-12-P

COURSE NAME	**COURSE OUTCOME**
Chi-square analyses	The students will get overall idea and comprehensive overview about Chi-square analyses for genetic ratio test
Identification of chromosomal aberration	The students will get overall idea and comprehensive overview about Identification of chromosomal aberration in *Drosophila* and man from photograph
Pedigree analysis	The students will get overall idea and comprehensive overview about Pedigree analysis of some inherited traits in animals.

DSE1. Parasitology

ZOOA-DSE(A)-5-1-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: Introduction to Parasitology	The Students will gain knowledge and a clear idea about Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector); Host parasite relationship
Unit 2: Parasitic Protists	The Students will gain knowledge and a clear idea about Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Giardia intestinalis, Trypanosoma gambiense,* *Leishmania donovani*
Unit 3: Parasitic Platyhelminthes	The students will get overall idea and comprehensive overview about Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Schistosoma haematobium, Taenia solium*
Unit 4: Parasitic Nematodes	The Students will gain knowledge and a clear idea about Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Ascaris lumbricoides, Ancylostoma duodenale, Wuchereriabancrofti,* Nematode plant interaction.

Unit 5: Parasitic Arthropods	The students will get overall idea and comprehensive overview about Biology, importance and control of ticks: Soft tick (*Ornithodoros),* Hard tick (*Ixodes*), mites (*Sarcoptes*), Lice (*Pediculus*), Flea (*Xenopsylla*) and Bug (*Cimex*). Parasitoid.
Unit 6: Parasite Vertebrates	The Students will gain knowledge and a clear idea about Cookicutter Shark, Hood Mocking bird, Vampire bats their parasitic behaviour and effect on host.

ZOOA-DSE(A)-5-1-P

COURSE NAME	**COURSE OUTCOME**
Study of life stages of *Giardia intestinalis*, *Trypanosoma gambiense*, *Leishmaniadonovani*, *Plasmodium vivax*, *Plasmodium falciparum* through permanent slides/micro photographs	The students will get overall idea and comprehensive overview about protozoan parasites.
Study of adult and life stages of *Schistosoma haematobium*, *Taeniasolium*through permanent slides/micro photographs	The students will get overall idea and comprehensive overview abouthelmith parasites.
Study of adult and life stages of *Ancylostomaduodenale*through permanent slides/micro photographs.	The students will get overall idea and comprehensive overview about*Ancylostoma* life stages.
Study of monogenea from the gills of fresh/marine fish [Gills can be procured from fish market as by product of the industry]	The students will get overall idea and comprehensive overview about monogenean parasite from gill of fish.
Study of nematode/cestode parasites from the intestines of Poultry bird [Intestine can be procured from poultry/market as a by-product] & Goat.	The students will get overall idea and comprehensive overview about poultry birds parasites.

DSE1. Endocrinology

ZOOA-DSE(B)-5-1-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: Introduction to Endocrinology	The Students will gain knowledge and a clear idea about General idea of Endocrine systems, Classification, Characteristic and Transport of Hormones, Neuro-secretions and Neuro-hormones: Examples and Functions
Unit 2: Hypothalamo-Hypophyseal Axis	The students will get overall idea and comprehensive overview about Structure and functions of hypothalamus and Hypothalamic nuclei, Regulation of neuroendocrine glands, Feedback mechanisms, Hypothalamo-Hypophyseal-Gonadal Axis. Structure of pituitary gland, Hormones and their functions, Hypothalamo-hypophyseal portal system
Unit 3: Peripheral	The Students will gain knowledge and a clear idea about Structure, Hormones

Endocrine Glands	and Functions of Thyroid gland, Parathyroid, Adrenal, Pancreas, Ovary and Testis. Disorders of endocrine glands (*Diabetes mellitus* type I & Type II; Graves' Disease).
Unit 4: Regulation of Hormone Action	The students will get overall idea and comprehensive overview about Mechanism of action of steroidal, non-steroidal hormones with receptors (cAMP, IP3-DAG), Calcium and Glucose homeostasis in mammals. Bioassays of hormones using RIA & ELISA, Estrous cycle in rat and menstrual cycle in human.
Unit 5. Non Mammalian Vertebrate Hormone	The Students will gain knowledge and a clear idea about Functions of Prolactin in Fishes, Amphibia & Birds Function of Melanotropin in Teleost fishes, Amphibians and Reptiles.

ZOOA-DSE(B)-5-1-P

COURSE NAME	**COURSE OUTCOME**
Dissect and display of Endocrine glands in laboratory bred rat.	The students will get overall idea and comprehensive overview aboutEndocrine glands
Study of the permanent slides of all the endocrine glands	The students will get overall idea and comprehensive overview aboutendocrine glands
Tissue fixation, embedding in paraffin, microtomy and slide preparation of any endocrine gland.	The students will get overall idea and comprehensive overview aboutTissue fixation
H-E staining of Histological slides.	The students will get overall idea and comprehensive overview aboutH-E staining.

PART III: SEMESTER 6
CORE COURSE 13: Developmental Biology
ZOOA-CC6-13-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: Early Embryonic Development	The Students will gain knowledge and a clear idea about Gametogenesis: Spermatogenesis, Oogenesis (sea urchin & mammal); Types of eggs, Egg membranes; Fertilization in sea urchin and mammal; Planes and patterns of cleavage; Types of Blastula [frog and chick]; Fate map in chick embryo, fate mapping using vital dye and radioactive technique; Gastrulation in frog and chick; Embryonic induction and organizers in *Xenopus*(Spemann & Mangold's experiment)
Unit 2: Late Embryonic Development	The Students will gain knowledge and a clear idea about Extra-embryonic membranes in Chick; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta)
Unit 3: Post	The students will get overall idea and comprehensive overview about

Embryonic Development	Development of brain and Eye in Chick. Molecular Induction in Brain and Eye development.
Unit 4: Implications of Developmental Biology	The students will get overall idea and comprehensive overview about *In vitro* fertilization (IVF), Stem cell: Concept of potency, types, markers and applications of stem cell therapy in bone marrow transplantation and cartilage regeneration

ZooA-CC6-13-P

COURSE NAME	**COURSE OUTCOME**
Study of whole mounts of developmental stages of chick embryo through permanent slides: 24, 48, and 96 hours of incubation	The students will get overall idea and comprehensive overview aboutwhole mounts of developmental stages of chick embryo
Study of the developmental stages and life cycle of *Drosophila*	The students will get overall idea and comprehensive overview aboutdevelopmental stages and life cycle of *Drosophila*
Study of different sections of placenta (photomicropgraph/ slides)	The students will get overall idea and comprehensive overview aboutplacenta
Identification of Invertebrate larva through slides/ photographs of Phylum Annelida, Arthropoda, Mollusca and Echinodermata	The students will get overall idea and comprehensive overview aboutInvertebrate larva.

CORE COURSE 14.Evolutionary Biology
ZOOA-CC6-14-TH

COURSE NAME	**COURSE OUTCOME**
Origin of Life	The students will get overall idea and comprehensive overview about Origin of Life (Chemical basis), RNA world hypothesis
Evolutionary concepts	The Students will gain knowledge and a clear idea about Historical review of Evolutionary concepts: Lamarkism, Darwinism and Neo Darwinism
Geological time scale	The Students will gain knowledge and a clear idea about Geological time scale, Fossil: types and age determination by Carbon dating, Evolution of horse
Natural Selection	The students will get overall idea and comprehensive overview about Natural Selection: Modes with Examples;
Species concept	The students will get overall idea and comprehensive overview about Species concept, Isolating mechanisms, modes of speciation; Speciation by chromosome rearrangement in *Drosophila*. Adaptive radiation/macroevolution (exemplified by Galapagos finches).
Origin and Evolution	The students will get overall idea and comprehensive overview about Origin and Evolution of Man, Unique Hominid characteristics contrasted with

	primate characteristic
Population genetics	The Students will gain knowledge and a clear idea about Population genetics: Hardy-Weinberg Law; factors disrupting H-W equilibrium (Genetic Drift, Migration and Mutation and Selection in changing allele frequencies (only derivations required). Simple problems related to estimation of allelic and gene frequencies.
Extinction	The Students will gain knowledge and a clear idea about Extinction, back ground and mass extinctions, detailed example of K-T extinction
Phylogenetic trees	The students will get overall idea and comprehensive overview about Phylogenetic trees, construction and interpretation of Phylogenetic tree using parsimony,convergent and divergent evolution.

ZooA-CC6-14-P

COURSE NAME	**COURSE OUTCOME**
Study of fossils from models/ pictures: Dickinsonia, Paradoxides (Trilobita), Asteroceras (Ammonoid), Pentremites (BlastoidEchinoderm), Ichthyosaur, Archaeopteryx, Cynodont.	The students will get overall idea and comprehensive overview about fossils from models/ pictures
Study of homology and analogy from suitable specimens.	The students will get overall idea and comprehensive overview abouthomology and analogy
Phylogenetic trees, Construction & interpretation of Phylogenetic tree using parsimony, Construction of dendrogram following principles of phenetics& cladistics from a data table.	The students will get overall idea and comprehensive overview aboutPhylogenetic trees, Construction & interpretation of Phylogenetic tree.

DSE2. Animal Biotechnology
ZOOA-DSE(A)-6-2-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: Introduction	The students will get overall idea and comprehensive overview about Organization of *E.coli* and *Drosophila* genome.
Unit 2: Molecular Techniques in Gene manipulation	The Students will gain knowledge and a clear idea about Recombinant DNA technology, Restriction endonucleases.Cloning Vectors & their features: Plasmids, Phage vectors, Cosmids, Phagemids, BAC, YAC,and HAC. Shuttle and Expression Vectors.Construction of Genomic libraries and cDNA libraries Transformation techniques: Cloning in bacteria and detection technique of clone Agarose and Polyacrylamide Gel Electrophoresis, Southern, Northern and Western blotting, Polymerase chain reaction: Allele specific, RAPD & RT PCR, DNA Fingerprinting
Unit 3: Genetically Modified Organisms	The students will get overall idea and comprehensive overview about Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection. Applications of transgenic animals: Production of pharmaceuticals, production

	of donor organs, knock-out mice.
Unit 4: Culture Techniques and Applications	The students will get overall idea and comprehensive overview about Animal cell culture, Expressing cloned genes in mammalian cells, Molecular diagnosis of 27,genetic diseases (Cystic fibrosis, Sickle cell anaemia, Thalassemia).Dolly &Polly cloning Genetically modified economically important animal Gene Therapy

ZOOA-DSE(A)-6-2-P

COURSE NAME	**COURSE OUTCOME**
Genomic DNA isolation from *E. coli* and Plasmid DNA isolation (pUC 18/19) from *E. coli*	The students will get overall idea and comprehensive overview aboutGenomic DNA isolation
To study following techniques through photographs - Southern Blotting, Northern Blotting, WestenBlotting, PCR, DNAfingerprinting	The students will get overall idea and comprehensive overview aboutSouthern Blotting, Northern Blotting, Western blotting
Project report on animal cloning & Application & ethical Issues.	The students will get overall idea and comprehensive overview aboutanimal cloning.

DSE1. Animal Behaviour and Chronobiology
ZOOA-DSE(B)-6-1-TH

COURSE NAME	**COURSE OUTCOME**
Unit 1: Patterns of Behaviour	The Students will gain knowledge and a clear idea about Stereotyped Behaviours (Orientation, Reflex); Individual Behavioural patterns; Instinct vs. Learned Behaviour; FAP, Associative learning, classical and operant conditioning, Habituation, Imprinting.
Unit 2: Social and Sexual Behaviour	The students will get overall idea and comprehensive overview about Social organisation in termites; Communication (dance & pheromones in Bees) Social behaviour: Altruism (Hamilton's rule and concept of haplodiploidy), Cooperation and Selfishness Sexual Behaviour: Sexual dimorphism, Mate choice in peacock, Intra-sexual selection (male rivalry in red deer) Kinship theory: Relatedness & inclusive fitness; parental care in fishes (Nest Building & coast benefit), conflict within families: parent offspring conflict and sibling rivalry
Unit 3:	The students will get overall idea and comprehensive overview about Types

Chronobiology & Biological Rhythm	and characteristics of biological rhythms: Short- and Long- term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms, Circannual rhythms; Photic and non-photic zeitgebers; Role of melatonin. Biological clock and its adaptive significance. Circannual rhythm in bird migration.

ZOOA-DSE(B)-6-1-P

COURSE NAME	COURSE OUTCOME
To study nests and nesting habits of the birds and social insects.	The students will get overall idea and comprehensive overview aboutnests and nesting habits.
To study the behavioural responses of wood lice to dry and humid conditions(demonstration only).	The students will get overall idea and comprehensive overview aboutbehavioural responses of wood lice to dry and humid conditions
To study geotaxis behaviour in earthworm.	The students will get overall idea and comprehensive overview aboutgeotaxis behaviour in earthworm
To study the phototaxis behaviour in insect larvae.	The students will get overall idea and comprehensive overview aboutphototaxis behaviour in insect larvae.
Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report.	The students will get overall idea and comprehensive overview about field study.
Study of circadian functions in humans (daily eating, sleep and temperature patterns).	The students will get overall idea and comprehensive overview aboutStudy of circadian functions in humans.

Course Specific Outcome

ZOOG

Part-I: Semester 1

ZOOG-CC1-1-TH

CORE COURSE 1: Animal Diversity

COURSE NAME	COURSE OUTCOME
Unit 1: **Kingdom Protista**	Students will gain knowledge and a clear idea about General characters and classification of kingdom protista and their Locomotory Organelles and about locomotion in *Amoeba* and *Paramecium*

Unit 2: **Phylum Porifera**	The students will get overall idea and comprehensive overview about General characters and classification of Phylum Porifera and about Canal System in *Sycon*
Unit 3: **Phylum Cnidaria**	The students will get overall idea and comprehensive overview about General characteristics and classification of Phylum Cnidaria and about Metagenesis in *Obelia*
Unit 4: **Phylum Platyhelminthes**	The Students will gain knowledge and a clear idea about General characteristics and classification of Phylum Platyhelminthes & Life history of *Taenia solium*
Unit 5: **Phylum Nemathelminthes**	The students will get overall idea and comprehensive overview about General characteristics and classification of Phylum Nemathelminthes & Life history of *Ascaris lumbricoides* and its adaptation
Unit 6: **Phylum Annelida**	The Students will gain knowledge and a clear idea about General characteristics and classification of Phylum Annelida & Metamerism in Annelida
Unit 7: **Phylum Arthropoda**	The students will get overall idea and comprehensive overview about General characteristics and classification of Phylum Arthropoda & Eye in Cockroach, Metamorphosis in Lepidoptera
Unit 8 :- **Phylum Mollusca**	The students will get overall idea and comprehensive overview about General characters and classification of Phylum Mollusca & Respiration in *Pila*
Unit 9 :- **Phylum Echinodermata**	The students will get overall idea and comprehensive overview about General characters and classification of Phylum Echinodermata & Watervascular system in Asteroidea
Unit 10 :- **Protochordates**	The students will get overall idea and comprehensive overview about General characters of Protochordates & Pharynx and feeding mechanism in *Amphioxus*
Unit 11 :- **Agnatha**	The students will get overall idea and comprehensive overview about General characters and classification of Agnatha
Unit 12 :- **Pisces**	The students will get overall idea and comprehensive overview about General characters and classification of Pisces & Osmoregulation in Fishes
Unit 13 :- **Amphibia**	The students will get overall idea and comprehensive overview about General characters and classification of class Amphibia & their Parental care
Unit 14 :- **Reptiles**	The students will get overall idea and comprehensive overview about General characters and classification of Reptiles & Poisonous and non-poisonous

	snakes, Biting mechanism
Unit 15 :- **Aves**	The students will get overall idea and comprehensive overview about General characters and classification of Aves & Flight adaptations in birds
Unit 16 :- **Mammals**	The students will get overall idea and comprehensive overview about General characters and classification of Mammals & Hair, Horn & Antler, Nail & claw

ZOOG-CC-1-1-P

COURSE NAME	**COURSE OUTCOME**
Identification with reasons	The students will get practical idea about the following specimens: *Amoeba, Euglena, Paramecium, Sycon, Obelia, Aurelia, Metridium, Taenia solium, Ascaris* *lumbricoides* (Male and female), *Aphrodite, Nereis, Hirudinaria, Palaemon, Cancer, Limulus, Apis, Chiton, Dentalium, Unio, Sepia, Octopus, Echinus, Cucumaria* and *Antedon, Balanoglossus, Branchiostoma, Petromyzon, Torpedo, Labeo rohita, Exocoetus, Salamandra, Hyla, Chelone, Hemidactylus, Chamaeleon, Draco, Vipera, Naja*, Bat, *Funambulus*
Key for Identification of poisonous and non-poisonous snakes	The students will get practical idea about how to distinguisg between poisonous and non-poisonous snakes and how to identify them
Study of anatomy of digestive system, salivary gland, mouth parts of *Periplaneta*, Study of reproductive system of female cockroach	The students will get practical idea about how to dissect *Periplaneta* properly and practically study the anatomy of digestive system, salivary gland, mouth parts of *Periplaneta*, and reproductive system of female cockroach

Part-I: Semester 2

ZOOG-CC2-2-TH

CORE COURSE 2: Comparative Anatomy & Developmental Biology

COURSE NAME	**COURSE OUTCOME**
Unit 1: **Integumentary System**	The Students will gain knowledge and a clear idea about Derivatives of integument with respect to glands in Birds & Mammals
Unit 2: **Digestive System**	The students will get overall idea and comprehensive overview about Stomach and Dentition of various mammal groups
Unit 3: **Respiratory**	The students will get overall idea and comprehensive overview about

System	Brief account of Gills, lungs, air sacs and swim bladder
Unit 4: **Circulatory System**	The Students will gain knowledge and a clear idea about Evolution of heart and aortic arches
Unit 5: **Urino-genital System**	The students will get overall idea and comprehensive overview about Succession of kidney, Evolution of urino-genital ducts
Unit 6: **Early Embryonic Development**	The Students will gain knowledge and a clear idea about Gametogenesis: Spermatogenesis and oogenesis with respect to mammals. Fertilization: Sea-Urchin; Early development of frog; structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula; types of morphogenetic movements; Fate of germ layers
Unit 7: **Late Embryonic Development**	The Students will gain knowledge and a clear idea about Placenta types and function; Metamorphic events in frog life cycle and its hormonal regulation

ZOOG-CC2-2-P

COURSE NAME	**COURSE OUTCOME**
Osteology	The students will get practical idea about studying and identifying Limb bones, girdle and vertebra of Pigeon & Guineapig, Mammalian skulls: One herbivorous; Guinea pig and one carnivorous; Dog.
Larval stages	The students will get practical idea about the Veliger, Nauplius, Trochophore, Mysis larva and their identifying features
Study of the different types of placenta	The students will get practical idea about histological sections of various types of mammalian placenta through photomicrographs.
Developmental stages of chick embryo	The students will get practical idea about Developmental stages of chick embryo at 24 Hrs., 48 Hrs, 72 Hrs., and 96 Hrs of incubation

Part-II: Semester 3

ZOOG-CC3-3-TH

CORE COURSE 3: Physiology and Biochemistry

COURSE NAME	**COURSE OUTCOME**
Unit 1: **Nerve and muscle**	The Students will gain knowledge and a clear idea about Structure of a neuron, resting membrane potential, Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres, Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction
Unit 2: **Digestion**	The students will get overall idea and comprehensive overview about Physiology of digestion in the alimentary canal; Absorption of

	carbohydrates, proteins, lipids
Unit 3: **Respiration**	The students will get overall idea and comprehensive overview about Pulmonary ventilation, Transport of Oxygen and carbon
Unit 4: **Cardio-vascular system**	The Students will gain knowledge and a clear idea about Composition of blood, Structure of Heart, Origin and conduction of the cardiac impulse, cardiac cycle
Unit 5: **Excretion**	The students will get overall idea and comprehensive overview about Structure of nephron, Mechanism of Urine formation; Counter-current Mechanism
Unit 6: **Reproduction and Endocrine Glands**	The Students will gain knowledge and a clear idea about Physiology of male reproduction: Histology of testis, hormonal control of spermatogenesis; Physiology of female, reproduction: Histology of ovary, hormonal control of menstrual cycle. Structure and function of pituitary, thyroid, pancreas and adrenal
Unit 7: **Carbohydrate Metabolism**	The Students will gain knowledge and a clear idea about Glycolysis, Kreb's cycle, Glycogenesis, Electron Transport Chain.
Unit 8: **Lipid metabolism**	The Students will gain knowledge and a clear idea about Beta oxidation of Palmitic acid {saturated (C 16:0)} and Linoleic acid {unsaturated (C 18:2)}
Unit 9: **Protein Metabolism**	The Students will gain knowledge and a clear idea about Transamination, Deamination, Urea cycle
Unit 10: **Enzyme**	The Students will gain knowledge and a clear idea about Enzyme Classification, factors affecting enzyme action, Inhibition

ZOOG-CC-3-3-P

COURSE NAME	**COURSE OUTCOME**
Study of permanent histological sections	The students will get practical idea about the Study of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland, duodenum, liver, lung, kidney.
Qualitative test	The students will get practical idea about the Qualitative test for carbohydrate samples, they will be able to perform various tests to find out and confirm the presence of various types of carbohydrates from a given sample solution.

Skill Enhancement Elective Courses (SEC)

ZOOG-SEC-A-3-1-TH

SEC-A: APICULTURE

COURSE NAME	**COURSE OUTCOME**

Unit 1: **Biology of Bees**	The Students will gain knowledge and a clear idea about Classification and Biology of Honey Bees Social Organization of Bee Colony
Unit 2: **Rearing of Bees**	The Students will gain knowledge and a clear idea about Artificial Bee rearing; Apiary, Beehives - Newton and Langstroth, Bee Pasturage; Selection of Bee Species for Apiculture; Bee Keeping Equipment; Methods of Extraction of Honey; Indigenous and Modern
Unit 3: **Diseases and Enemies**	The Students will gain knowledge and a clear idea about Bee Diseases and Enemies Control and Preventive measures
Unit 4: **Bee Economy**	The Students will gain knowledge and a clear idea about Products of Apiculture Industry and its Uses ;Honey, Bees Wax, Propolis, Pollen etc
Unit 5: **Entrepreneurship in Apiculture**	The Students will gain knowledge and a clear idea about Bee Keeping Industry - Recent Efforts, Modern Methods in employing artificial Beehives for cross

Part-II: Semester 4

ZOOG-CC4-4-TH

CORE COURSE 4: Genetics & Evolutionary Biology

COURSE NAME	**COURSE OUTCOME**
Unit 1: **Mendelian Genetics and its Extension**	The Students will gain knowledge and a clear idea about Principles of Inheritance, Chromosome theory of inheritance, Incomplete dominance and codominance, Multiple alleles, lethal alleles, sex linked inheritance in *Drosophila* (White eye locus) & Human (Thalassemia).
Unit 2**: Linkage, Crossing Over**	The Students will gain knowledge and a clear idea about Linkage and crossing over, Complete & Incomplete Linkage, Recombination frequency as a measure of linkage intensity. Holiday Model
Unit 3: **Mutation**	The Students will gain knowledge and a clear idea about Chromosomal mutation, Deletion, duplication, inversion, translocation, aneuploidy, gene mutation, induced mutation, types & example
Unit 4: **Sex determination**	The Students will gain knowledge and a clear idea about Genic Balance theory and dosage compensation in *Drosophila*.
Unit 5: **Origin of Life**	The Students will gain knowledge and a clear idea about Chemical Origin of life
Unit 6: **Evolutionary Theories**	The Students will gain knowledge and a clear idea about Lamarckism, Darwinism, Neo-Darwinism.
Unit 7: **Process of**	The Students will gain knowledge and a clear idea about Isolating

Evolutionary changes	mechanism, Natural Selection.
Unit 8: **Speciation**	The Students will gain knowledge and a clear idea about Sympatric, Allopatric, Parapatric Speciation

ZOOG-CC4-4-P

COURSE NAME	**COURSE OUTCOME**
Verification of Mendelian Ratio	The students will get practical idea about the Chi Square test and they will learn to perform Chi Square tests and perform the Verification of Mendelian Ratio using this method .
Identification	The students will get practical idea about the Identification of Human Aneuploidy using photo graph of karyotype.
Phylogeny of horse	The students will get practical idea about the Phylogeny of horse with diagram of limb and skull.
Study and identification of Darwin Finches	The students will get practical idea about the Study and identification of Darwin Finches through photographs
Visit to natural history museum	The students will get practical idea about a natural history museum, its significance and will learn how to prepare and submit project report based on their visit.

Skill Enhancement Elective Courses (SEC)

ZOOG-SEC-B-4-2-TH

SEC-B: Aquarium Fish Keeping

COURSE NAME	**COURSE OUTCOME**
Unit 1: **Introduction to Aquarium Fish Keeping**	The Students will gain knowledge and a clear idea about The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes
Unit 2: **Biology of Aquarium Fishes**	The Students will gain knowledge and a clear idea about Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish
Unit 3: **Food and feeding of Aquarium fishes**	The Students will gain knowledge and a clear idea about Use of live fish feed organisms. Preparation and composition of formulated fish feeds
Unit 4: **Fish Transportation**	The Students will gain knowledge and a clear idea about Live fish transport - Fish handling, packing and forwarding techniques
Unit 5: **Maintenance of Aquarium**	The Students will gain knowledge and a clear idea about General Aquarium maintenance - budget for setting up an Aquarium Fish Farm as a

	Cottage

Part-III: Semester 5

ZOOG-DSE-A-5-1-TH

DSE-A: Applied Zoology

COURSE NAME	**COURSE OUTCOME**
Unit 1**: Host & Parasite Relationship**	The Students will gain knowledge and a clear idea about Type of Host, Types of Parasites, and Other types of Relations.
Unit 2**: Epidemiology of Diseases**	The Students will gain knowledge and a clear idea about Transmission, Prevention and Control of Tuberculosis and Typhoid
Unit 3: **Parasitic Protozoa**	The Students will gain knowledge and a clear idea about Life History and pathogenicity of *Entamoeba histolytica, Plasmodium vivax* and *Trypanosoma gambiense.*
Unit 4: **Parasitic Helminthes**	The Students will gain knowledge and a clear idea about Life History and pathogenicity of *Alcylostoma duodenale, Wuchereria bancrofti*
Unit 5: **Insect of Economic Importance**	The Students will gain knowledge and a clear idea about Biology, Control and Damage caused by *Heliocoverpa armigera, Pyrilla perpusilla, Sytophilus oryzae* and *Tribolium casteneum*.
Unit 6: **Insect of Medical Importance**	The Students will gain knowledge and a clear idea about Medical Importance and control of *Anopheles*
Unit 7: **Animal Husbandry**	The Students will gain knowledge and a clear idea about Preservation and artificial insemination in cattle; Induction of early puberty and synchronization of estrus in cattle
Unit 8: **Poultry Farming**	The Students will gain knowledge and a clear idea about Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs
Unit 9**: Fish Technology**	The Students will gain knowledge and a clear idea about Genetic improvements in aquaculture industry; Induced breeding and transportation of fish seed

ZOOG-CC4-4-P

COURSE NAME	**COURSE OUTCOME**
Study of parasites	The students will get practical idea about *Plasmodium vivax, Entamoeba histolytica, Trypanosoma gambiense, Ancylostoma-duodenale* and *Wuchereria bancrofti* and their life stages
Study of arthropod vectors	The students will get practical idea about arthropod vectors associated with human diseases: *Pediculus, Culex, Anopheles, Aedes*
Study of insect	The students will get practical idea about insect damage to different plant

damage	parts/stored grain
Identifying feature and economic importance of some pests	The students will get practical idea about Identifying feature and economic importance of *Helicoperva; Heliothis armigera,Papilio demoleus*, *Pyrilla perpusilla*, *Callosobruchus chinensis, Sitophilus oryzae* and *Tribolium castaneum*
Visit to poultry farm or animal breeding centre	The students will get practical idea about poultry farm or animal breeding centre
Maintenance of freshwater aquarium	The students will get practical idea about Maintenance of freshwater aquarium

Part-III: Semester 6

ZOOG-DSE-B-6-2-TH

DSE-B: Ecology& Wild life Biology

COURSE NAME	**COURSE OUTCOME**
Unit 1**: Introduction to Ecology**	The Students will gain knowledge and a clear idea about Ecosystem, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere
Unit 2: **Population**	The Students will gain knowledge and a clear idea about Attributes of population: Life tables, fecundity tables, survivorship curves, dispersal and dispersion. Geometric, exponential and logistic growth, equation and patterns, Population regulation: density-dependent and independent factors,
Unit 3: **Community**	The Students will gain knowledge and a clear idea about Community characteristics: species diversity, abundance, dominance, richness, Vertical stratification, Ecotone and edge effect.
Unit 4: **Ecosystem**	The Students will gain knowledge and a clear idea about Types of ecosystem with an example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies
Unit 5: **Wild Life**	The Students will gain knowledge and a clear idea about Wildlife Conservation (in-situ and ex-situ conservation)**:** Necessity for wildlife conservation; National parks & sanctuaries, Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve

ZOOG-DSE-B-6-2-P

COURSE NAME	**COURSE OUTCOME**
Identification	The students will get practical idea about Identification of flora, mammalian fauna, avian fauna
Demonstration of basic equipment	The students will get practical idea about Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global

	Positioning System, Various types of Cameras and lenses)
Familiarization and study of animal evidences in the field	The students will get practical idea about Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, etc.
Study of an aquatic ecosystem	The students will get practical idea about Phytoplankton and zooplankton, Measurement of area, temperature, salinity, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO2

DEPARTMENT OF PHYSICS

PROGRAMME OUTCOMES, PROGRAM SPECIFIC OUTCOMES, COURSEOUTCOMES

Course Outcomes: Physics

Physics is the heart of science. It not only aims to explain the endless mysteries of the Universe but also helps to understand the theories of other branches of science like Chemistry or Biological Sciences at the deepest level. The arena of Physics is all pervading. It covers the stars and Galaxies at one end of the scale and the world of sub-atomic particles on the other. Study of Physics instills in us the habit of reasoning, to look for the cause and effect relations, to seek the logical explanation of every phenomenon, not only in nature but also in our life and society. It helps developing a scientific culture and wipes out misconceptions and superstitions, which is so essential in our society. The knowledge of Physics in essential for inventing, developing, manufacturing or repairing modern machines and instruments and hence forms an indispensable part of the training of the professionals who aspire to build a career in these areas. Even for a layman, a preliminary idea of this subject helps in understanding the working principles of the commonly used machines/gadgets at the basic level and hence facilitates a safe and better handing of such machines.

Job opportunities after completing this course include research work in Institutes within the country and abroad, teaching career in universities, colleges and schools, going for higher studies like M.Sc, B.Tech, Integrated M.Tech and Integrated Ph.D programs. Master degree and Ph.D programs in various allied branches become open for the students of this course. These include Electronics, Computer Science, Oceanography, Atmospheric Science, Environmental Science and so on. Students may even seek administrative jobs like I.A.S, I.P.S. etc., by appearing in the appropriate competitive examinations.

Program Specific Outcomes: Physics

Semester I	**1.1 Mathematical Physics - I** The section recapitulates the basic concepts of Calculus, learnt by the students at the +2 level. Mathematical object like **Vectors** and **Matrices**are introducedand their properties are discussed. In the corresponding Practical Course, the programming language '**Python**' and the graph-plotting software '**Gnuplot**' is introduced.
	1.2 Mechanics Mechanics is the most fundamental branch of Physics. It lays the foundation stone through teaching the students the basic laws of Particle Dynamics, Rigid-body Dynamics and Fluid Dynamics.

Semester II	**2.1 Electricity and Magnetism** The Electrostatic and the Magneto-static field are introduced and their properties are discussed. The inter-relation between electric and magnetic field is also studied and **Maxwell's Equations**, which form the basis of the theory of electro-magnetism are introduced.
	2.2 Waves and Optics The properties of **Simple Harmonic Motion** and wave motions are discussed. The properties of Light, in which its wave nature is manifested, are discussed. Thus, the fact that light is a wave motion is established

Semester III	**3.1 Mathematical Physics – II** **Fourier Series** and **Fourier Transform** are introduced. Methods of solving **Ordinary** and **Partial Differential Equations** are taught. The students are introduced to the theory of **Probability**, which forms the basis of Statistical Mechanics to be introduced later. In the corresponding Practical Course, The different modules in Python language are introduced and methods of Numerical Integration, Interpolation
	3.2 Thermal Physics The **Laws of Thermodynamics** and their applications to study thermal properties of various systems are discussed. The kinetic molecular models of ideal and real gases are introduced and it is demonstrated how to derive various properties of gases on the basis of such models. The theory of heat conduction is also developed.
	3.3 Modern Physics The Foundation of **Quantum Mechanics** as the basic theory of ModernPhysicsis laid down. The basics of Nuclear Physics are discussed. The principles of LASER production are discussed.
	SEC A-2 : Renewable Energy and Energy Harvesting In the present days of energy crisis, harvesting different renewable sources of energy is of utmost importance. This course introduces the different conventional and alternate sources of energy
Semester IV	**4.1 Mathematical Physics – III** The Calculus of Complex Numbers is developed.The 'Calculus of Variation' is introduced and the **Lagrangian** and the **Hamiltonian Formulation** of Classical Mechanics is developed as examples of this technique. The **Special Theory of Relativity** is introduced, which shows how the results of Newtonian Mechanics are to be modified for fast moving particles. In the corresponding Practical Course, one learns to evaluate Improper Integrals, to solve Ordinary and Partial Differential Equations, to study the properties of
	4.2 Analog Electronics The modern age is the age of electronics in general and semiconductor electronics in particular. The present section discusses the properties and applications of semiconductor devices like **P-N Diodes**, **Bipolar Junction Transistors**and **Field Effect Transistors**.**Amplifiers, Feedback Amplifiers** and **Operational Amplifiers**(with its variousapplications) are studied. **Multivibrators** and**Oscillators** of various types are discussed.

	4.3 Quantum Mechanics Quantum Mechanics is the basic theory for the sub-atomic world. In this course, students learn Quantum Mechanics as a problem solving methodology with applications in Atomic Physics.
	SEC B-2 : Electrical Circuits and Network Skills Describes the structures and functioning of some basic electrical instruments like **Generators, Transformer** and **Motors**.
Semester V	**5.1 Electromagnetic Theory** Visible light, microwave, radio wave, etc., are all forms of Electromagnetic wave. The properties of such waves can all be explained in terms of Maxwell's Electromagnetic Theory. The purpose of the present section is to develop the theory for propagation of EM wave in bounded and unbounded media.
	5.2 Statistical Physics The purpose of this section is to explain the properties of a macroscopic object in terms of a statistical description of its microscopic constituents. All the three distribution functions (MB, FD and BE) are derived and their application in appropriate systems are studied.
	DSE A1 (a) : Advanced Mathematical Method Introduces and studies the properties of mathematical objects like **Groups, Fields, Vector spaces,** and **Tensors**. While studying this section, students become acquainted with the concepts of Abstract Algebra, which are essential parts of the language of advanced Theoretical Physics.
	DSE B1 (b) : Nuclear and Particle Physics Nuclear Physics and the Physics of sub-atomic particles provide insight into the structure of all matters. The study of the Elementary Particles and the Fundamental Interactions paves the way towards the frontiers of modern Physics for the students.
Semester VI	**6.1 Digital Systems and Applications** Digital Electronics lies at the root of the majority of electronic gadgets and machines, in the current age. The present course helps the students to understand the working principles of the basic digital circuits, e.g. **the dataprocessing circuits, sequential circuits, counters** and **registers**. This is the age of computers. The present course provides insight into the basic structure of a
	6.2 Solid State Physics Among the three stats of matter, the gaseous state is discussed in the previous sections and the liquid state is relatively less understood. The present course discusses various properties of the solid state, e.g. the **specific heat**, the **dielectric constant**, the **magnetic susceptibility**, etc., of a solid, in terms of a microscopic theory.

	DSE A2(b) : Advanced Classical Dynamics The Lagrangian and the Hamiltonian formalism of Classical Mechanics is developed and some advanced topics like the rigid-body rotation, the small oscillation problem, etc., are discussed within these frameworks. The basic techniques of describing **Non-linear Dynamical Systems** are taught, which throws light on the path to reach the frontiers of research in this field.
	DSE B2(b) : Advanced Statistical Mechanics The Classical Statistical Mechanics is revisited. The **Density MatrixFormulation** of Quantum Statistical Mechanics is introduced. Ideal Bose and Fermi systems are discussed. Non-equilibrium Statistical Mechanics is introduced, which may lead the students to the research horizon in this field.

DEPARTMENT OF CHEMISTRY

PROGRAMME OUTCOME – BACHELOR OF SCIENCE(BSc)

Chemistry Honours (UG) course deals with the study of chemical changes of matter. It focuses on chemical transformations, recognition at both macro and microscopic levels. It provides an excellent opportunity to students and learners to explore the chemical universe around us and to understand the logic and principles behind fascinating changes taking place at all levels in the molecular world. The subject demands a sharp analytical mind and a certain amount of curiosity from the learners' part. The course is divided into three main sections namely: Physical, Inorganic and Organic Chemistry, but eight papers altogether.

Almost 40% of the course comprises practical classes where the students get the opportunity to verify chemical principles learned in the classroom through hands–on experiments. The key concepts discussed are : Physical Chemistry, Thermodynamics, Statistical Thermodynamics, Chemical Kinetics, Kinetic Theory of Gases, Quantum Mechanics, Electrochemistry, Phase Rules, Spectroscopy, and Photochemistry; Inorganic Chemistry : Chemical Bonding and Periodicity, Elemental Chemistry, Complex Chemistry, Redox Chemistry, Crystal Field Theory, Bioinorganic Chemistry, Organometallics; Organic Chemistry : Bonding in Organic Molecules, Organic Reactions and their Mechanisms, Stereochemistry, Functional Group Chemistry, Organic Synthesis, Heterocyclic Chemistry Organic Spectroscopy. There are ample opportunities of higher studies after completion of this course and the job prospect is also excellent.

NAME OF THE PROGRAMME	PROGRAMME OUTCOME	COURSE SPECIFIC OUTCOME				
		COURSE CODE	COURSE NAME	COURSE OUTCOME		
B.Sc. Chemistry(Hons)	1. Students will be entirely equipped with the knowledge of all the branches of Chemistry such as physical, inorganic, organic & analytical chemistry. 2. The ability to analyse and explain chemical phenomena with the basic principles and fundamental s	CEMA-CC-1-1-TH	INORGANIC CHEMISTRY-1 ORGANIC CHEMISTRY – 1A	To acquaint students with the basic concepts of atomic structure, acid-base & redox reactions in Inorganic Chemistry as well as the fundamentals of Organic Chemistry like bonding, physical properties & reaction mechanisms.		
		CEMA-CC-1-1-P	Corresponding PRACTICALS	inorganic practical will illustrate redox reactions and acid-base reactions to the students. Also the experiments on separation of binary		
			and to write it concisely. 3. The ability to analyse inorganic and organic samples qualitatively and in some cases quantitatively 4. The expertise to set up an experiment (estimation or synthesis of a compound) and work up. 5. The			mixture based upon solubility will enable the students to identify the nature and classification (acidic, basic or neutral) of organic compounds.
				CEMA-CC-1-2-TH		To provide students with the know ledge of kinetic theory, chemical kinetics, basic stereochemistry & reactive intermediates.

			knowledge and training to operate many physicochemical instruments and to carry out experiments there in. 6. The ability to interpret IR and NMR spectra of organic compounds. 7. The ability to work individually or in a group following a systematic plan 8. Introduction of Computer under CBCS at the UG level will upgrade the Quality of Education. 9. The confidence to prepare and defend a	CEMA-CC-1-2-P	Corresponding PRACTICALS	Physical Chemistry experiments and calculation of results with Excel will benefit the students. Also theywill learn boiling point determination of different liquids.
				CEMA-CC-2-3-TH	ORGANIC CHEMISTRY-2	To provide students with detailed understanding in various advanced aspects of stereochemistry, reaction energetics and mechanism (substitution & elimination).
				CEMA-CC-2-3-P	Corresponding PRACTICALS	Preparation, purification, melting point determination and yield calculation of various compounds by

			scientific presentation in individual capacity. 10. CBCS imparts better academic outcome among teachers and students in teaching learning system.			different methodology enhance the skill of the students in organic chemistry laboratory.
				CEMA-CC-2-4-TH	INORGANIC CHEMISTRY-2	To introduce the concept of bonding-both ionic and covalent in details. Radioactivity is also introduced here.
				CEM A-CC-2-4P	CORRESPOND ING PRACTICALS	Practical will continue to demonstrate redox reactions and will also teach estimation of metals from alloys.
				CEM A-CC-3-5TH	PHYSICAL CHEMISTRY 2	To update students with the ideas of Thermodynamics and Electrochemistry.
				CEM A-CC-3-5P	CORRESPONDING PRACS	Conductometric and Potentiometric experiments with Excel programming enrich students
				CEM A-CC-3-6TH	INORGANIC CHEMISTRY 3	It introduces chemical periodicity and subsequently teaches chemistry of elements belonging to different

						groups in details. It introduces coordination chemistry in this module.
				CEMA - CC-3-6-P	Corresponding PRACTICALS	Students will learn to carry out complexometric titration and chromatographic separation of mixture of metal ions. They will also be enriched with the idea of gravimetric estimation.
				CEM A-CC-3-7TH	ORGANIC CHEMISTRY-3	To acquaint students with the chemistry of alkenes, alkynes, carbonyls, aromatics & organometallics. Most importantly, conception of C-C bond formation and breaking, required for synthetic organic chemistry is created.
				CEM A-CC-3-7P	Corresponding PRACTICALS	Identification of solid and liquid compounds and quantitative estimations augment the experimental skills of the students.
				SEC 2	ANALYTICAL CLINICAL BIOCHEMISTRY	To enhance students' skill in Chemistry of various biomolecules and Biochemistry of disease through a combination of theoretical know ledge as w ell as hands on practical.

				CEMA - CC-4-8-TH	ORGANIC CHEMISTRY-4	To enable students with in depth know ledge in the logic of organic synthesis, nitrogen compounds, rearrangement reactions & organic spectroscopy so that they understand designing of synthetic routes and its viability.
				CEM A-CC-4-8P	Corresponding PRACTICALS	Qualitative analysis of single solid organic compounds and derivative preparation develop the student's practical skill as w ell as the understanding of organic reactions.
				CEMA - CC-4-9-TH	PHYSICAL CHEMISTRY-3	To enrich students with the know ledge of Solution Chemistry, Solids, Quantum Chemistry and Phase Equilibrium.
				CEMA - CC-4-9-P	Corresponding PRACTICALS	Polarimetric, pH-Metric and phase rule-based experiments enrich the students.
				CEM A-CC-4- 10-TH	INORGANIC CHEMISTRY-4	To teach coordination chemistry in details along w ith chemistry of d- and f block elements. Reaction kinetics and

						mechanism are also taught here.
				CEM A-CC-4- 10-P	Corresponding PRACTICALS	To acquaint students with inorganic preparations and to learn the use of spectrophotometer in practical.
				SEC 3	PHARMACEUTI CALS CHEMISTRY	To enhance students' skill with the knowledge of synthesis & mechanism of action of different drugs, production of important molecules by fermentation and hands on practical.
				CEM A-CC-5- 11-TH	PHYSICAL CHEMISTRY-4	To impart advanced ideas in the field of Quantum Chemistry, Statistical Thermodynamic and Computer based Numerical Analysis.
				CEM A-CC-5- 11-P	Corresponding PRACTICALS	Experiments based on Computer like Numericals are a new approach of Chemistry.
				CEM A-CC-5- 12-TH	ORGANIC CHEMISTRY-5	To develop concepts in diverse chemistry of heterocycles, polynuclear hydrocarbons and biomolecules, w hich constitute most of the natural products. Moreover cyclic stereochemistry and

						FMO approach in pericyclic reactions complete the foundation of Organic Chemistry.
				CEM A-CC-5- 12-P	Corresponding PRACTICALS	Different types of chromatographic separation techniques develop an all round skill which will help the students in their future studies. Moreover, implementation of IR and NMR spectroscopy will enhance the idea.
				DSE-A2	APPLICATIONS OF COMPUTERS IN CHEMISTRY	To benefit students with the know ledge of computer applications in understanding various aspects of physical chemistry through plots and spreadsheets.
				DSE-B1	INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE	To introduce students With some materials and processes important in industries. Practical will include different types of estimation and analysis of industrially important compounds.
				CEM A-CC-6- 13-TH	INORGANIC CHEMISTRY-5	To build up the concept of qualitative analysis by teaching the students the theory behind it. It also includes Bioinorganic Chemistry and Organometallic Chemistry learning.

				CEM A-CC-6- 13-P	Corresponding PRACTICALS	Students will learn qualitative semimicro analysis of inorganic mixtures having three radicals with special emphasis on understanding of the chemistry of different reactions therein.
				CEM A-CC-6- 14-TH	PHYSICAL CHEMISTRY-5	To inculcate students with the know ledge of Spectroscopy, Photochemistry, Surface Chemistry & Polarisation to complete their ideas of Physical Chemistry.
				CEM A-CC-6- 14-P	Corresponding PRACTICALS	Spectrophotometric and Surface experiments educate students to a large extent.
				DSE B4	DISSERTATION	It is the manifestation of ideas, know ledge and practical skill, a student would gather during the entire UG curriculum under CBCS. This will enable them to plan & execute a particular work with necessary literature survey and to present the outcome in a systematic manner, thus will prepare them to take a research career in future.

DEPARTMENT OF ECONOMICS

	Course Name	Course Outcome of Economics (B.Sc.)
	Introductory Microeconomics	This course helps the students to understand the scope and method of economics. The students can understand the basic principles of economics, the concepts of demand and supply, how markets work. This course also provides the knowledge about the economic role of government with respect to market.
	Mathematical Methods in Economics	This course enables the students to understand the mathematics behind economics, that is, the mathematical justification behind economic interpretation. Mainly the functions, integration, matrix algebra etc are taught in this course.
	Introductory Macroeconomics	This course helps the students to understand the basic concepts of macroeconomics like GDP, GNP and the process of National Income Accounting. Different theories and methods of income determination are taught in this course.
	Intermediate Microeconomics	This course enables the students to understand a more detail of microeconomics. Theories of Consumer behavior, production and cost, input in perfect competition are taught in this course.
	Intermediate Macroeconomics	The students get detail knowledge about the Aggregate Demand and Aggregate Supply of the economy, Monetary policy, Inflation unemployment etc. Thus a regular picture and macroeconomic fluctuations of the market can be understood by the students.
	Statistical Methods in Economics	Statistics is an integral part of economics. Statistical tools like probability, probability distributions like binomial, poisson, normal and sampling (with and without replacement)
	Data Analysis	The students gets an idea about the research field, collection of data, sources of empirical data, different rounds of statistical survey
	Rural Development	The students gets the practical idea of how the rural economy works, the structure of rural

		economy, Self help Group, rural credit, role of National Bank for Agricultural and Rural Development
	Introductory Econometrics	The basic scope and nature of econometrics is learnt in this course and the Classical Linear Regression Model, Classical assumptions, violation of classical assumptions are taught.
	Research Methodology	This gives the idea of research like field survey, data entry after field survey, theoretical and empirical research methodologies, how to write a research paper.
	Managerial Economics	This gives the students an idea about demand, cost and profit analysis, pricing policies, capital budgeting, cost of capital etc.
	International Economics	This course teaches us how to trade with other countries, absolute and comparative advantage of trade , factor endowment and trade, trade models for developing countries, trade policies
	Indian Economy	This gives the students the idea of Indian economic development since independence, human development in the fields of education and health, growth and distribution, economic reforms in India
	Economic History of India	This paper give details of impact of British rule in India, aspects of British Policies in India
	Comparative Economic Development	The basic scope and nature of this paper is to learn strategies on policies of economic development specially of regions like Japan, South East Asia , China.
	Financial Economics	This gives the students the idea of Financial aspects like Investment theory and portfolio analysis, options and derivatives, corporate finance.
	Public Economics	This paper give details of role of government in an market economy, choice and public economics, the revenue and expenditure of the government, public finance
	Development Economics	This paper gives an idea what do we mean by economic development, poverty and inequality, dual economy models, population growth and

		economic development, development strategies
	Money and Financial Markets	This paper gives an idea about money and banking , financial institutions, instruments, financial innovations, banking system, interest rates and their behavior, central banking and monetary policy
	Environmental Economics	The students gets an idea about what is environmental economics, pareto optimality, market failure, pigouvian fees, regulating pollution, international environmental problems etc.

Programme Outcome:

1. Understanding how different degree of competition in a market affect pricing and output.
2. Understanding the efficiency and equity implications of market interference including government policy
3. Developing research knowledge in economics
4. Developing the skill of data collection and use of sampling techniques in research
5. Developing the knowledge about the theories of economic growth and development and issues of economic planning.
6. Creating awareness about changing macro-economic policies and theories

Programme Specific Outcome (PSO):

1. Student can pursue higher studies, i.e., Master Degree in Economics from University of Calcutta, and also from other universities.
2. Student can also choose to do MBA, MCA after doing graduation in economics.
3. Students can appear for all competitive exams after their economics graduation like, UPSC(IAS, IPS, IRS) and WBCS exam, banking etc.
4. Students have a clear understanding of Economics analysis; therefore, they are more preferable candidates for any analytical jobs like for the post of financial analyst, business analyst.
5. Students in the long run can pursue their career in research in economics.

Department of Microbiology (Under Graduate Hons)

Programme Outcomes (PO)

PO1	To introduce valuable knowledge of the subject as well as a strong foundation in inter disciplinary approach.
PO2	To develop practical skill, knowledge of advanced technology and experience to handle different microbes
PO3	To gather strong, basic knowledge and understanding of the microbiological concepts to support diversification in applied field of microbiology such as biochemical and biomedical, industrial, environment, biotechnology, genetics, agriculture, food etc .
PO4	To develop excellent communication skills both in written as well as spoken language for developing expertise in good power of articulation while pursuing higher studies , research and industrial exposure.
PO5	To set career and professional goals based on a clear outlook of the situation and proper career planning process in higher education, as Academician, Industry professionals and environmental activist
PO6	To stimulate young minds to think innovatively and nurture scientific temper as an outcome of attending several awareness programmes, scientific lectures and interactive sessions

Program Specific Outcome (PSO)

PSO1	Students are able to explain the fundamental concepts, core theories, methods and practices in different branches of Microbiology
PSO2	They are able to identify the microorganisms, classify them on the basis of their morphological characteristics, and the relation between them and the environment
PSO3	They can explain a rational understanding of the diversity of microorganisms, structure, functions
PSO4	They are able to understand the bioinformatics and biostatistics
PSO5	They can explain the role of microorganism in biosphere.

PSO6	They can apply the scientific methods for laboratory and conventional investigations safely and formulate valid conclusions based on the results in the field of Microbiology
PSO7	Describe the role of microbes in human, food and dairy technology, agriculture, process of heritable information in microorganisms and forming new genetic combinations through recombinant DNA
PSO8	Recognize bio safety measures, intellectual property rights and explore career related options in the field of Microbiology
PSO9	Employ their knowledge of various bio molecules and enzymatic properties of microbes and fermentation processes in developing environment friendly products or processes

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Course outcomes

CC-1: Introduction to Microbiology and Microbial Diversity CC-2: Bacteriology CC-3: Biochemistry CC-4: Cell Biology CC-5: Virology CC-6: Microbial Physiology and Metabolism CC-7: Molecular Biology CC-8: Microbial Genetics CC-9: Environmental Microbiology CC-10: Recombinant DNA Technology	• Scope of C1 and C2: Students will get the knowledge of importance of microbiology and classification of microorganism, different methods in practical to identify microorganism • Scope of C3 and C4: This paper will provide the knowledge of nutrition and structure of bio molecules and growth of microorganism. • Scope of C5 and C6 : These units will help to understand Virology & Immunology Content: Nature of viruses, viral classification, cultivation of viruses and Type study of TMV & HIV. In immunology Types of Immunity, immune organs, cells, antibodies and antigen-antibody interactions and metabolism of microorganism. Concept of virology will help to understand molecular biology • Scope of C7 and C8: Students can develop the basics of molecular biology and microbial genetics • Scope of C9 and C10 : These units help to develop concept of environmental microbiology and recombinant microbiology.

CC-11: Food and Dairy Microbiology CC-12: Industrial Microbiology CC-13: Immunology CC-14: Medical Microbiology Discipline Specific Elective (Any Four) DSE-1: Bioinformatics DSE-2: Microbial Biotechnology DSE-3: Advances in Microbiology DSE-4: Plant Pathology DSE-5: Biomathematics and Biostatistics DSE-6: Inheritance Biology DSE-7: Microbes in Sustainable Agriculture and Development DSE-8: Biosafety and Intellectual Property Rights DSE-9: Instrumentation and Biotechniques DSE-10: Project Work Skill Enhancement Elective Courses (Any Two) SE-1: Microbial Quality Control in Food and Pharmaceutical Industries SE-2: Microbial Diagnosis in Health Clinics SE-3: Biofertilizers and Biopesticides SE-4: Food Fermentation Techniques SE-5: Management of Human Microbial Diseases	• Scope of C11 and C12 : These units help to develop food and dairy microbiology and Industrial microbiology. • Scope of C!3 and C14: These two units help to develop idea of mechanism of function of body immune system and mechanism of pathogenicity of different microorganism. • Elective-I Molecular Biology and Microbial Genetics Content: DNA, RNA, Protein structure and synthesis. DNA damage, mutations and repair. Gene transfer methods. Scope: This paper provides basic information of molecular biology. Understanding of bio molecule synthesis and control will help in further study • Elective-II DNA Technology Content: Covers materials required, procedures and applications of • Recombinant DNA technology. Few advanced techniques of r DNA technology are also discussed. Scope: It is the most advanced subject in Microbiology having abroad applications in industrial, medical , agricultural fields. Hence students with this knowledge can work in biotechnology industries with above applications. . With the knowledge of microbiology students can work in hospitals, pharmacy and industries. Elective-I: Industrial Microbiology Content: Explains History, screening, media, Fermentation, assays with examples of industrially important processes. Scope: It makes students self reliance in the industrial application of Microbiology in life and industry. Entrepreneurship can be established with the gained knowledge. Elective-II: Fermentation Technology Content: It contains modern fermentation techniques with important processes like Bio-fertilizers, Bio-fuels etc.,IPRs were also discussed. Scope: The students obtain the advanced knowledge to work in fermentation industries. The knowledge of IPR's makes students to enable to protect their technologies.

SE-6: Microbiological Analysis of Air and Water	

DEPARTMENT OF ENVIRONMENTAL SCIENCE

Programme Outcomes and Program specific outcomes of Environment Science General course at UG level Course

Mechanism of communication:

The programme outcomes are communicated to the teachers and students in the following manner:

- The hard copy of syllabus and the learning outcomes are made available in the department for ready reference of teachers and students
- The entire course of study and the outcomes are well displayed in the college Notice Board for information of all
- In every IQAC meeting and College committee meeting the importance of programme outcomes are discussed with the teachers
- Students are also informed and made aware of the positivity of the programme outcomes in their classes.

Programme -------**B.Sc. (Gen)**

The programme of Bachelor of Science in environmental science (General) offers theoretical and practical knowledge about different areas of study in environmental science that includes ecology , ecosystem ,biodiversity , chemistry of the environment and Environmental Physics and Meteorology.
Hence Environmental science is a Multidisciplinary study
This course is most suited for students who have strong interest and background studies in Biology, Physics, chemistry and Mathematics.

This course intends to develop amongst the undergraduate students to:

i. Acquire an in-depth knowledge on natural processes that sustain life, and govern economy.

ii. Develop the power to understand the consequences of human actions on the life, global economy and quality of human life.

iii. It encourages to nurture the power of critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.

iv. The course enables the students to learn the values and attitudes towards understanding complex

environmental-economic social challenges, and causes inspiration amongst the students in participating actively in solving current environmental problems and to face the challenges and to devise ways to prevent the problems that may occur in future

v. Imbibe the spirit of sustainability as a practice in life, society and industry.
vi. It helps in development of scientific temper amongst the students

vii On completion of the course students have different options to go forward with higher studies in M.Sc followed by research work for further future career improvement as well as contributing to the welfare of mankind through scientific studies

viii After higher studies students can take up their career as scientist or any other professional work related to this subject. Students can pursue higher studies in environmental engineering and environmental management.

ix Students can join in different civil services ,in government sectors ,in private sectors

Course outcome : Department of Environmental Science

The subject covers a wide range of scientific disciplines covering ecology, environment, biodiversity,chemistry and physics and meteorology.

- It creates awareness about environmental problems
- It imparts basic knowledge about the environment and its allied problems.
- It develops an attitude of concern for environment

The department aims to provide the students with an up to date level of understanding of environment and sensitize the students towards the need for keeping environment clean and the necessity to conserve our natural resources

Semester I	**Concept of Environment and Environmental Science**: The course aims at : • To inculcate amongst the students definition, types and components of Environment and to make them understand the scopes and objective of Environmental and Ecological Science; Relationship of Man and environment • To aware the students about Environmental literacy (formal and non-formal education) and to understand and analyze the classification of environmental problems, Green House effect, Climate change, Acid deposition desertification, Ozone layer depletion. • To have an overall idea regarding important atmospheric events like western disturbance, tropical cyclones, monsoon and the phenomenon of El Nino and understand the climatic zone of the world .Equatorial, Tropical, Sub-Tropical, Tundra. • To study the principle and applications of following instruments(autoclave, incubator, BOD incubator, hot air oven, light microscope, pH meter, conductivity meter, spectrophotometer) in **practical**
Semester II	**Ecology and Biodiversity** This part of the course is designed to make the student understand : • Population and Community Ecology • Ecosystem ecology • Concept and Importance of Biodiversity • Threats to Biodiversity, measurement of biodiversity and its conservation • Identification of environmentally important flora and fauna with characteristics features (Practical)
Semester III	**Chemistry of the Environment** **This course deals with** • Basics of General Chemistry: • Basics of Chemical Equilibrium and Kinetics: • Water Chemistry: • Air Chemistry: • Soil Chemistry • Chemistry of Heavy metals: • Estimation of water quality parameters - pH, conductivity, free CO2, hardness, alkalinity,chloride, Dissolved oxygen and Estimation of Soil quality parameters - pH, conductivity, organic carbon.(Practical)

Semester IV	**Environmental Physics and Meteorology** This course gives an introduction to the basic concepts of • Thermodynamics: • Energy Interactions: Energy equilibrium between biotic and abiotic environmental component. • Concept of Radiation Physics**,** Types of Electromagnetic radioactivity and its units, characterizations of various rays, application of radio isotopes; Biological effects of radiation. • Techniques related to environmental physics: Acoustic radar; Application of LASER radiations; Electrical detection of airborne particles using surface ionization techniques; Biosensor: Concept and application. • Concept of Meteorology that relates to basic knowledge of climatological parameters for environmental study; Weather and climate; Classification of Climate; Fundamentals of temperature, pressure, relative humidity, rainfall and wind speed; Concept of atmospheric stability; Mixing height, temperature inversion. • Recording of wind speed, relative humidity, atmospheric pressure, rainfall, insolation and light intensity.
Semester V	**Discipline specific elective DSE –A1 and DSE –A2 (ANY ONE)** **DSE A1** The objective of this course is to make an understanding on
	• Energy and environment • Energy resources ,its demand and management and audit **DSE A -2** This part deals with • Environmental economics and statistics • Concept of environmental economics • Study on national resource economics and tools for environmental economic policy and carbon trading
Semester VI	**Discipline specific electives DSE B-1 AND DSE B-2 (ANY ONE)** **DSE B-1** The objective is to have an insight into Natural hazards and disaster Management • Definition ,types and concepts of Natural hazards and Disasters • Anthropogenic hazards • Disaster Management **DSE B-2** This part deals with Solid Waste Management • Definition, source ,generation of solid waste ,their classification • Effect of solid waste and its disposal on environment • Solid waste Management • Resource recovery from waste for reuse, recycle and reduce waste • Policies on waste management that includes Acts and Rules

SKILL ENHANCEMENT COURSE	**SEC-A [Any one Paper either in 3rd or 5th Semester**] ENV-G-SEC-3-A1-TH: Environmental Laws and policy, Environmental Audit and EIA This part relates to • Fundamental rights and duties in Indian Constitution; Policies related to Environment Environmental legislation ,Audit and Impact Assessment ENV-G-SEC-5-A2-TH: Environmental Pollution and Green Technologies The objective of this part is to impart • Definition of pollution, their classification • Air and noise pollution • Water pollution • Pesticide pollution • Pollution control • Green technologies and their applications
	SEC-B [Any one Paper either in 4th or 6th Semester] ENV-G-SEC-4-B1-TH: Applications of Environmental Biotechnology This course is an introduction to the

	• Principles of different biotechnological methods • Biotechnological applications • Application of biotechnology in waste treatment • Ecologically safe products and processes • Genetically Modified and Genetically Modified Organism ENV-G-SEC-6-B2-TH: Remote sensing, GIS and its applications This part relates to the study of • Remote sensing • Geographical Information Systems • Application of remote sensing and GIS

DEPARTMENT OF COMMERCE

1.**PROGRAMME OUTCOME (PO) BACHELOR OF COMMERCE (B.COM)**

B.Com is one of the programs in the general and traditional academic system and it is a means of career building and employment opportunity which becomes available to the students after the successful completion of the program .

This program is designed in such a way as to allow students to develop managerial and analytical skills, financial literacy, business acumen and leadership skill.

It is a degree program structured to provide the students managerial skill and disciplines related to Trade, Commerce, and Industries, and corporate affairs. By the end of the program, students gain an in-depth knowledge on core subjects like accounting, law, statistics, , marketing, taxation just name a few. However the outcome as derived or expected to be derived or acquired the benefit of the program named Bachelor of Commerce are mentioned below for convenience:

- It enables the students to take decision at personal and professional level. It also enables students to develop business acumen, managerial skills and abilities of accounts.
- It provides the knowledge how to start up own business independently. This program encourages entrepreneurship spirit among students and encourage them to participate effectively in social, commercial and civic senses ultimately leading to national development.
- Students can acquire the knowledge, skill in different areas of communication, decision making, innovation and problem solving in day to day business activities. This will develop the ability to think critically and independently translate into well developed personal value system.

- Students are able to do their higher education and can make research in the field of accounting and finance, marketing and taxation etc. Students can pursue the commerce course at post-graduation level like M.Com, MBA M. Phil,

Considering all these in depth of B. Com program outcome the following conclusion may be drawn on the basis of the opportunities and future prospective available to the students of commerce after successful completion of B.com course:-

1. **Employment opportunity**- It provides high employment opportunity as it educates the students regarding financial aspect of business need to be managed.
2. **Career prospects**- Here is scope for the student to explore himself after obtaining degree. Looking for career prospects in the interdisciplinary domains of commerce can provide excellent job opportunities. Like Banking, Company Secretary, Chartared Accountancy, Economics, Cost work and Accountancy, Stock Broking,
3. **Numerous job profile options**- A successful B.Com student can choose to be any of the following:- Accountant

   Tax Auditor

   Finance Manager

   Cost Accountant

   Finance Analyst

   Finance Planner

   Port Folio Manager

   Invesment Analyst

   Stock Broker

2. SPECIFIC PROGRAM OUTCOME:-(SPO)

Among commerce courses students may have mind set up in selecting from specialized and specific fields in force under the University of Calcutta such as

- **Accounting and Finance,**
- **Marketing Management**
- **Taxation**
- **Computer application and e-business**

- **Accounting and Finance,**
  1. Accounting and finance in a broad sense enables the students to be the master of accounting concepts and convention both nationally and globally by the way of applying the accounting standards with the convergence with IFRS which may help a student of B.Com to be an accountant, financial adviser , Auditor ,financial analyst etc.
  2. It enhances the knowledge of finance and commerce in the students pursuing B.Com; . Students will be able to communicate effectively both in terms of business as well as social interaction
  3. It provides a knowledge of different specialization in accounting, taxation, costing banking & finance with practical exposure.
  4. Students are able to learn relevant Advanced accounting career skills, applying both quantitative and qualitative knowledge to their future career in business. It enhances the knowledge through systematic and subject skill within various disciplines of finance, auditing and taxation, accounting and management, Business communication and computer

application, Micro -economics and Macroeconomics, mathematics and statistics, cost and management accounting, business ethics and entrepreneurship development etc. Thus, Students can also get practical skill to work as accountant, audit assistant, tax consultant, and computer operator and also other financial supporting services.

- **Marketing Management**

  This course enhances practical knowledge and the tactics in the marketing, trend and concepts of marketing.

  1. As it focuses on practice and application of theory such as research, nature of consumers, sales management, advertising, quality of management, law and ethics in the marketing environment, an all-out employment spectrum in this arena become accessible to the students of Marketing management. For example, Marketing manager, marketing assistant, marketing co-ordinator Digital marketing manager etc.

  2. It prepares students for entrepreneurship and employment in the corporate world. It enhances enough business and financial knowledge that they can adapt to a job or of an entrepreneur.

- **Taxation**

  This course prepares students for various position in the area of tax department and various financial administration ,financial planning , wealth management ,property valuation etc.

  1. It enables the students to develop to file income tax return and compute tax liability of assessee (rather **person** as defined in Income Tax Act)
  2. It prepares the students to develop the proficiency in tax management of an organization. It helps to be a good Tax consultant, Tax auditor and Tax adviser.
  3. It enable the students to be efficient for the effective mobilization of funds with minimum tax obligation by the way of tax planning and procedure.

- **Computer application and e-business**

Students are able to be familiar with computer environment and operating systems; it enable the students to introduce the accounting package like tally and to develop skill and practical knowledge in education of commerce.

This course makes the students fit for not only IT sector but also for corporate world. It makes the students to become smart and employable as it bridges the commerce and computer applications. Training in computer application and e-business transactions in the field of commerce is an extra mileage in placements.

1. After completion of this programme one can join any of the area like MBA, MCA,M.Com (CA) ACS, etc., computer programmer , computer assistant, computer laboratory technician.
2. By the technology of e-commerce students are able to understand the significance and application in the sphere of B2C, B2B, C2C.
3. It enables the students to be well versed in Electronic funds transfer, in on line business dealing and in digital business activities.

COURSE OUTCOME (CO) :

B.Com course covers a broad areas with different subjects relating to economic activities of entity . As a result, the outcomes with multiple dimensions are available to a student of B.Com pursued or pursuing this program. The different subjects in the teaching and learning method are taught within 3 years consisting of 6^{th} semester periods. However, the courses (both in honours and general) and its outcome is being projected here under ignoring the semester wise subjects rather emphasizing on the subjects taught during the semesters.

1. Financial Accounting:

a. It enables the students to learn principles and concepts of accountancy.

b. students are enabled with the knowledge in the practical application of accounting.

c. It enables the students to learn the basic concepts of partnership accounting, corporate accounting and all other allied aspects of accounting.

d. The students will get through knowledge on the accounting practice prevailing in business entity with profit motive and service oriented

e. It helps to find out the technical expertise in maintaining the books of accounts, the fairness and trustworthiness of prepared accounting reports.

2. Entrepreneurship development and Business Ethics-

students are able to acquire the knowledge of business environment which helps to develop entrepreneurship awareness and it motivates the students to think for startup of new venture. It educates the students to carry the concept and techniques of fair business practices by the way of applying the established and popular business ethics following the CSR and social needs.

3 **Communicative English** develop oral and written communicative skills of the students and, develop overall linguistic competence which ultimately helps employment;

4. **Business Economics** provides knowledge of micro and macroeconomics concepts and inculcate an analytical approach to the subjects, economic theories and economic reasoning to solve the business problems and it educates the students the theory and practice of economics like GNP,NNP, INCOME AT FACTOR COST, per capita income, It helps the students to make the business matched and balanced with the economic environment . It makes the students understand the effectiveness of economic factors in taking business decision.
5. **Principle and Practice of Management, and Human Resource Management** helps to understand the concepts, principles, theory and practice of management and ensure the managerial efficiency in the case of finance, personnel and governance in the business activities. It helps to acquire the policies and techniques for motivating the human resources into human capital. It helps to know the tools and techniques of coordination, planning, control, organization etc. and the way of application the same in the business entity.
6. **Financial Mangement** helps in improving profitability of organizations and increases the overall value of the firms or organizations. It provides economic stability by the way of determination of optimum capital structure, framing financial policies and regulation, imposing financial control, investing capital for effective return.

It helps to open a lot of diverse career opportunities like investment banking, entrepreneurship, financial analysis, financial and managerial accounting. It helps to take decision for effective and productive financing the entity with minimum risk and, determining the startup capital in the case on newly set up.

7. **Company law and Business law** educates the students regarding fundamental Rules and Provisions of different Acts and company Act and its application in business particularly in corporate affairs. It helps for employment in different areas in corporate affairs and other business entities. It enables the students to have a clear conception of the laws and acts regulating the overall activities of the entity.

8. **Cost and management accounting** enable the students to take decision by the way of ensuring cost efficiency and establishing cost control for further development of the business for both long term and short term basis. It educates the mechanism for making harmony between theory and practice of different method of costing.

   It helps the students to diagnose the company/business entity by applying the tools and techniques of Management accounting and able to find out the remedial measures for the development of the business. It helps to take decision for development, renovation, modification and adoption of strategies and technique for the entity.

9. **BUSINESS MATHEMATICS & STATISTICS** helps the students to acquire new skill of application of statistical tools and techniques in business for decision making, popular quantitative tools used in business, practical exposure on calculation of measures of average, correlation, and regression. Students can understand the techniques and concept of different types of index and matrix.

   It enables the students to take decision in the case of critical affairs related to the investment of funds and or asset. It helps to measure the business risk, financial risk, and to take decision for best possible alternative uses of fund.

10. **Information Technology** helps to make the students to be updated and smart in practicing the different tools and means used in computer. It helps to know the theory and application of different system and concepts in software engineering, Tally i.e accounting packages and to understand the system of networking with different language of computer. It has very much functional and effective to the students of commerce. It creates the employment opportunity through the knowledge of computer application in business.

11. **Auditing and taxation** –Students will be versed in the fundamental concept of auditing and different aspect of Direct and Indirect tax. It enhances the knowledge about preparation of audit report, submission of income tax return, advance tax, tax deducted at source. Indirect tax enables the students to determine the GST, IGST to submit GST return etc. and it becomes helpful for the employment of the student of commerce in corporate and other business firm.

    It makes the employment easily accessible to the students of B.Com with the knowledge of principle and practice, rules and regulations , Acts and provision for the computation of income , submission of return on income, assessment of return of income in connection with direct and indirect taxation . By the knowledge of auditing students become able to act as audit assistant, financial advisor, accountant.
