LOCF for the Programme B.Sc. General (BSCG)

School of Sciences, IGNOU

Expected Programme Learning Outcomes (PLOs) in terms of :	**Knowledge and understanding:** The graduates should be able to demonstrate the acquisition of: • comprehensive, factual, theoretical, and specialized knowledge in broad multidisciplinary contexts with depth in the underlying principles and theories relating to one or more fields of learning. • knowledge of the current and emerging issues and developments within the chosen field(s) of learning. • procedural knowledge required for performing and accomplishing professional tasks associated with the chosen fields of learning.
	Skills: The graduates should be able to demonstrate the acquisition of cognitive and technical skills required to: • perform and accomplish complex tasks relating to the chosen fields of learning. • evaluate and analyse complex ideas relating to the chosen field(s) of learning; • generate solutions to specific problems associated with the chosen fields of learning.
	Application of Knowledge & Skills: The graduates should be able to demonstrate the ability to: • apply the acquired specialized technical or theoretical knowledge, and cognitive and practical skills to gather and analyse quantitative/qualitative data to assess the appropriateness of different approaches to solving problems, • employ the right approach to generate solutions to problems related to the chosen fields of learning.
	Generic Learning Outcomes: *Communication skills:* The graduates should be able to demonstrate the ability to: • listen carefully, to read text related to the chosen fields of learning analytically and present complex information in a clear and concise manner to different groups/audiences.

	• communicate in writing and orally the constructs and methodologies adopted for the studies undertaken relating to the chosen fields of learning, • make coherent arguments to support the findings/results of the study undertaken to specialist and non-specialist audience. *Learning how to learn*: The graduates should be able to demonstrate the ability to: • meet one's own learning needs relating to the chosen field(s) of learning, • pursue self-paced and self-directed learning to upgrade knowledge and skills that will help adapt to changing demands of workplace and pursue higher level of education and training. *Critical thinking*: The graduates should be able to demonstrate the ability to: • critically evaluate evidence for taking actions to generate solutions to specific problems associated with the chosen fields of learning based on empirical evidence. *Judgment and decision making*: The graduate should be able to: • make judgement and take decisions based on the analysis and evaluation of information for formulating responses to problems, including real-life problems, • exercise judgement across a broad range of functions based on empirical evidence, for determining personal and/or group actions to generate solutions to specificproblems associated with the chosen fields of learning.
	Constitutional, Humanistic, Ethical, and Moral Values: The graduates should be able to demonstrate the willingness and ability to: • embrace the constitutional, humanistic, ethical, and moral values, and practice these values in life. • identify ethical issues related to the chosen fields of study, • formulate coherent arguments about ethical and moral issues, including environmental and sustainable development issues, from multiple perspectives. • follow ethical practices in all aspects of research and development, including avoiding unethical practices such as fabrication, falsification or misrepresentation of data or committing plagiarism.

	Employability & Entrepreneurship skills: The graduates should be able to demonstrate the acquisition of: • knowledge and essential skills set and competence that are necessary to take up a professional job relating to the chosen field of learning and professional practice, • entrepreneurship skills and mindset required for setting up and running an economic enterprise or pursuing self-employment requiring the exercise of full personal responsibility for the outputs of own work, and full responsibility for output of group, • the ability to exercise management and supervision in the contexts of work or study activities involving unpredictable work processes and working environment.

LOCF for the Geology Component of BSCG

Expected Learning Outcomes (LOs) in terms of :	**Knowledge:** The graduates should be able to • Demonstrate systematic understanding of the fundamental concepts and principles of geology. • Develop an understanding of the earth resources, earth history, geological processes, landforms and structural features. •
	Skills: The graduates should be able to • Observe, analyze and describe characteristics of minerals, rocks, fossils and landforms. • Acquire the critical thinking required to plan data collection in the field and analyze data.
	Application of Knowledge & Skills: The graduates should be able to: • Examine and analyze the natural resources, environment and hazards from geological perspective. • Demonstrate spatial and critical thinking ability in analysing geological processes and features. • Study and map geological features and also interpret the geological maps.
	Generic Learning Outcomes: The graduates should be able to: • Meet one's own learning needs related to the programme. • Pursue self-paced and self-directed learning. • Achieve higher education in the field of geology. • Gather and interpret relevant quantitative and qualitative data to identify issues from geological perspectives • Listen, read and present the information related to the course in a concise and clear manner. •
	Constitutional, Humanistic, Ethical, and Moral Values: The graduates should be able to demonstrate the willingness to: • Devise ideas and reflect appreciation of societal and environmental issues associated with the sustainability of Earth's physical resources. • Raise public awareness about the value of geological heritage and geodiversity; • Identify the social obligations and roles that geoscientists have, as well as the potential ethical, cultural, and economic effects of their work; • Support a critical examination of the use and management of georesources, in an environmentally and socially responsible manner. • Practice team work and mutual respect towards fellow learners and colleagues. • Follow ethical practices in conducting practicals. •
	Employability & Entrepreneurship skills: The graduates should be able to: • Apply the knowledge and skills gained for career and professional development in geology. • Exhibit skills and attitudes they need to get and keep a job as a professional geologist and help utilize earth resources in a sustainable way.

Expected Learning Outcomes (LOs) in terms of :	**Knowledge:** The graduates should be able to: • Develop a conceptual understanding of the fundamental principles of physics, including the major premises of mechanics, electromagnetism, thermal physics and modern physics • Synthesize concepts from various areas of physics and develop an understanding of the scientific method; • Develop a proficiency in the mathematical tools required in the study of physics • Develop proficiency in using a variety of laboratory instruments, taking readings and in the analysis and interpretation of such data.
	Skills: The graduates should be able to: • Recognize the relevant physical laws, apply their knowledge of physics to analyze a broad range of physical phenomena and explain the current understanding of different physical phenomena; • Conduct experiments, demonstrate their understanding of the scientific method and take measurements in a physics laboratory; • Demonstrate written and oral communication skills in communicating physics-related topics.
	Application of Knowledge & Skills: The graduates should be able to: • Solve problems using scientific reasoning and quantitative methods, using their understanding of fundamental physics and calculate measurable quantities demonstrating understanding of physical systems; • Demonstrate an ability to set up mathematical descriptions of physical systems using the concepts studied; • Demonstrate the ability to apply their knowledge and hands-on skills to real world settings.
	Generic Learning Outcomes: The graduates should be able to: • Meet one's own learning needs related to the programme; • Pursue self-paced and self-directed learning; • Prepare themselves for higher education in physics; • Understand and communicate physical concepts in a concise and clear manner.
	Constitutional, Humanistic, Ethical, and Moral Values: The graduates should be able: • Demonstrate an understanding of the impact of physics and science on society; • Demonstrate scientific temper in their attitude towards problem solving , decision making and analysis of new ideas; • Demonstrate the scientific values of integrity, open-mindedness, consensus –oriented approach and objectivity; • Use their knowledge of physics to understand and promote sustainable development goals in climate change, energy efficiency, etc.
	Employability & Entrepreneurship skills: The graduates should be able to: Apply the knowledge and skills gained for career and professional development in physics, problem solving in the real world and developing innovative technology.

<table>
<tr><td rowspan="3">Expected Learning Outcomes (LOs) in terms of :</td><td>Knowledge: The graduates should:
demonstrate fundamental systematic knowledge of mathematics and its applications in engineering, science, technology and mathematical sciences;
demonstrate educational skills in areas of calculus, real analysis, algebra, differential equations etc;
apply knowledge, understanding and skills to identify the difficult/unsolved problems in mathematics and to collect the required information in possible range of sources and try to analyse and evaluate these problems using appropriate methodologies;
fulfil one’s learning requirements in mathematics, drawing from a range of contemporary research works and their applications in diverse areas of mathematical sciences;
apply one’s disciplinary knowledge and skills in mathematics in newer domains and uncharted areas;
identify challenging problems in mathematics and obtain well-defined solutions.</td></tr>
<tr><td>Skills: The graduates demonstrate the:
Ability to communicate various concepts of mathematics effectively using examples and their geometrical visualizations;
Ability to use mathematics as a precise language of communication in other branches of human knowledge;
Ability to communicate long standing unsolved problems in mathematics;
Ability to show the importance of mathematics as precursor to various scientific developments since the beginning of the civilization;
Ability to explain the development of mathematics in the civilizational context and its role as queen of all sciences;
Ability to employ critical thinking in understanding the concepts in every area of mathematics;
Ability to analyze the results and apply them in various problems appearing in different branches of mathematics;
Capability to solve problems in computer graphics using concepts of linear algebra;
Ability to provide new solutions using the domain knowledge of mathematics.</td></tr>
<tr><td>Application of Knowledge & Skills:
Bachelor’s degree in mathematics is the culmination of in-depth knowledge of algebra, calculus, real analysis, differential equations and several other branches of mathematics. This also leads to study of related areas like computer science and statistics. Thus, this programme helps learners in building a solid foundation for higher studies in mathematics;
The skills and knowledge gained has intrinsic beauty, which also leads to proficiency in analytical reasoning. This can be utilised in modelling and solving real life problems;
Students undergoing this programme learn to logically question assertions, to recognise patterns and to distinguish between essential and irrelevant aspects of problems. They also share ideas and insights while seeking and benefitting from knowledge and insight of others. This helps them to learn behave responsibly in a rapidly changing interdependent society;
Students completing this programme will be able to present mathematics clearly and precisely, make vague ideas precise by formulating them in the</td></tr>
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	language of mathematics, describe mathematical ideas from multiple perspectives and explain fundamental concepts of mathematics to non-mathematicians; • Completion of this programme will also enable the learners to join teaching profession in primary and secondary schools;
	Generic Learning Outcomes: The graduates should: • develop deep interest in learning mathematics; • develop broad and balanced knowledge and understanding of definitions, concepts, principles and theorems; • be familiar with suitable tools of mathematical analysis to handle issues and problems in mathematics and related sciences; • have enhanced ability to apply the knowledge and skills acquired by them during the programme to solve specific theoretical and applied problems in mathematics; • have sufficient knowledge and skills enabling them to undertake further studies in mathematics and its allied areas in multiple disciplines concerned with mathematics; • develop a range of generic skills helpful in employment, internships and social activities.
	Constitutional, Humanistic, Ethical, and Moral Values: The graduates should be able to demonstrate the: • Ability to identify unethical behaviour such as fabrication, falsification or misrepresentation of data and adopting objective, unbiased and truthful actions in all aspects; • Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning; • Ability to work independently and do in-depth study of various notions of mathematics.
	Employability & Entrepreneurship skills: The graduates should: • have he knowledge and essential skills set and competence that are necessary to take up a professional job relating to mathematics; • possess entrepreneurship skills and mindset required for setting up and running an economic enterprise or pursuing self-employment requiring the exercise of full personal responsibility for the outputs of own work, and full responsibility for output of group; • have management and supervisory capacity in the contexts of work or study activities involving unpredictable work processes and working environment; • have enhanced employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises; • exhibit subject-specific transferable knowledge in mathematics relevant to job trends and employment opportunities.

• **Expected Learning Outcomes (LOs) in terms of :**	• **Knowledge:** The graduates should be able to: • Demonstrate a systematic or coherent understanding of the fundamental concepts, principles and processes underlying the academic field of chemistry, with subfields (analytical/inorganic/organic/physical), and linkages with related disciplinary areas • Procedural knowledge that creates different types of professionals in the field of chemistry and related fields such as pharmaceuticals, chemical industry, teaching, research, environmental monitoring, product quality, consumer goods industry, food products, cosmetics industry, etc.; • **Skills:** The graduates should be able to: • Practical skills related to specialisation areas within chemistry as well as within subfields of chemistry (analytical, inorganic, organic and physical), and other related fields of study, including broader interdisciplinary subfields (life, environmental and material sciences). • Demonstrate skills relating to quantitative analysis of metal ions and other inorganic/organic compounds • **Application of Knowledge & Skills:** The graduates should be able to: • Use skills required for the extraction, separation, identification and synthesis of a variety of organic compounds • Use newer techniques and methods of analysis in the identification of inorganic and organic compounds and use of IR, NMR and other spectroscopic techniques • skills for working safely and competently in the laboratory • **Generic Learning Outcomes:** The graduates should be able to: • Meet one's own learning needs related to the programme. • Pursue self-paced and self-directed learning to upgrade knowledge and skills. • Achieve higher education in the field of chemistry • Communicate information and explanation related to specialized field • Listen, read & present the information related to the course in concise & clear way. • Demonstrate a keen sense of observation, enquiry and capability of asking relevant questions • Make a correct judgment of a given situation to generate appropriate solution • **Constitutional, Humanistic, Ethical & Moral Values:** The graduates should be able to: • Recognize and appreciate the importance of the

	chemical sciences and its application in academic, industrial, economic, environmental and social contexts • Practice team work and mutual respect towards fellow learners and colleagues. • Follow ethical practices, especially in conducting lab based work. • Undertake ideas and practices keeping in view the environment sustainability goals • **Employability & Entrepreneurship skills:** The graduates should be able to: • Apply the knowledge and skills gained for career and professional development in chemistry. • Undertake hands on lab work and practical activities which develop problem solving abilities required for successful career in pharmaceuticals, chemical industry, teaching, research, environmental monitoring, product quality, food products, cosmetics industry, etc. • Use chemical techniques relevant to academia and industry, generic skills and global competencies, including knowledge and skills that enable students to undertake further studies in the field of chemistry or a related field, and work in the chemical and non-chemical industry sectors.

Expected Learning Outcomes (LOs) in terms of :	**Knowledge:** The graduates should be able to: • define the basic concept and scope of Botany; • explain the foundation, interdisciplinary and multi-disciplinary approach of Botany; • discuss the diversity of plants and microbes and their habitat, morphology, and reproduction; • depict knowledge of disease-causing microbes and other applied areas; • understand the basic concepts of ecology and environment; • gain comprehensive knowledge of major concepts, theoretical principles and experimental findings in genetics, and molecular biology of plants; • understand the basic concepts of molecular biology, genetic engineering, plant tissue culture and its applications; and • understand various analytical techniques in plant sciences.
	Skills: The graduates should be able to: • learn and perform laboratory experiments related to plant sciences. • use the theoretical knowledge of instrumentation and techniques in the field of anatomy, physiology, biochemistry, biotechnology, ecology and utilization of plants; • apply the technology for plant molecular biology data analysis and interpretation of results; • enhance their ideas/findings/concepts regarding plant sciences; and • develop effective and efficient research projects in the field of plant sciences.
	Application of Knowledge & Skills: The graduates should be able to demonstrate the ability to: • understand the knowledge of plant sciences that can be applied in a real-world situation; • utilize technical knowledge to produce a varied range of professionals in the fields of education, government and public service, research and development; • use broad knowledge, logical thinking, and skills to solve plant science-related problems; • develop evidence-based solutions by gathering and analyzing pertinent quantitative and/or qualitative data from various sources and experiments; and • apply subject knowledge and expertise in the identification of medicinal plants.
	Generic Learning Outcomes: The graduates should be able to demonstrate the ability to: • effectively communicate plant science-related information; • solve plant science-related issues logically through experimentation, data processing and followed by its applications; • understand complex phenomenon of plant biochemistry

	using virtual lab; • utilize computational biology along with biostatistics for plant science-related data analysis; and • pursue self-paced and self-directed learning for personal and socio-economic growth.
	Constitutional, Humanistic, Ethical, and Moral Values: The graduates should be able to demonstrate the willingness to: • develop an approach to all learners from different backgrounds; • use ethical practices while conducting experiments, research, and project work; • utilize available resources, and manage the project responsibly by following appropriate biosafety regulations; • avoid unethical practices including data fabrication, falsification, misrepresentation, and plagiarism; and • consider *sustainable* development in order to tackle *environmental issues.*
	Employability & Entrepreneurship skills: The graduates should be able to: • apply their knowledge and skills to develop the plant-based product; • apply acquired skills in health sciences including diagnosis of microorganisms; • promote herbal medicines to treat various disease; • develop entrepreneurship in the field of horticulture, nursery management, hybrid seed development for enhancing agricultural productivity; • provide technical skills for employability in environment-related projects, consultancy and entrepreneurship to start commercial plant tissue culture laboratory; and • find employability in the field of teaching and scientific writing skills.

Expected Learning Outcomes (LOs) in terms of :	**Knowledge:** The graduates should be able to demonstrate the acquisition of knowledge to: • Define the meaning and scope of Zoology. • Explain the foundation, interdisciplinary and multi disciplinary approach of Zoology. • Discuss the evolution, growth, development and novel dimension of Zoology as Discipline. • Demonstrate comprehensive knowledge of major concepts, theoretical principles and experimental findings in Zoology and its different subfields including biodiversity, anatomy, physiology, biochemistry, biotechnology, ecology, evolutionary biology, cell biology, molecular biology, immunology and genetics. • Depict knowledge of some of the other applied areas of study such as wildlife conservation and management, apiculture, sericulture, fish and fisheries sciences. • Exhibit interdisciplinary knowledge of allied biological sciences, environmental science and chemical science. • Utilise learning of the various techniques, instruments, computational software used for analysis of animal's forms and functions.
	Skills: The graduates should be able to demonstrate the acquisition of skills required to: • Perform laboratory investigations. • Use the theoretical knowledge of instrumentation and techniques in the field of chordates and nonchordates, genetics, animal physiology, evolution, immunology and medical entomology. • Use technology for data analysis and interpretation of results. • Develop effective and efficient research projects in the field.
	Application of Knowledge & Skills: The graduates should be able to demonstrate the ability to: • Demonstrate a logical and consistent understanding of the broad concepts in Zoology, its applications, and related interdisciplinary subjects. • Utilise technical knowledge that produces varied types of professionals in the fields like research and

	development, teaching, government and public sector service. • Utilise wide-range knowledge, logical thinking and skills for evaluating problems and issues related to Zoology. • Collect pertinent quantitative and/or qualitative data obtained from various sources/experiments, and analysis of the data using appropriate research methodologies to formulate evidence-based solutions. • The investigations undertaken in a variety of contexts using the major concepts, principles and techniques of the subject(s) effectively communicate and precisely. • Meet one's own learning desires, employing broad range of research and development work and professional materials. • Apply one's subject knowledge and skills to novel circumstances enabling to solve complicated problems with evidence-based well-defined elucidations. • Demonstrate subject-related skills relevant to Zoology-related jobs and employment opportunities.
	Generic Learning Outcomes: The graduates should be able to demonstrate the ability to: • Convey the intricate zoological information effectively and efficiently. • Analyze and solve the problems related to animal sciences without relying on assumptions and guess work. • Seek solutions and logically solve them by experimentation and data processing either manually or through software. • Use computers for biological simulation, computation and appropriate software for biostatistics, and employing search tools to locate, retrieve, and evaluate zoology-related data. • Pursue self-paced and self-directed learning aimed at personal and social development.
	Constitutional, Humanistic, Ethical, and Moral Values: The graduates should be able to demonstrate the willingness to: • Develop an inclusive approach towards all learners of varying abilities and backgrounds. • Follow ethical practices in conducting experiments, research and project work.

	• Work effectively in a heterogeneous team. • Recognise and mobilise relevant resources essential for a project, and manage the project in a responsible way by following ethical scientific conduct and bio-safety protocols. • Avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, as well as appreciate environmental and sustainability issues.
	Employability & Entrepreneurship skills: The graduates should be able to: • Possess the knowledge and skills to perform laboratory investigations, and field trips, taxonomic jobs. • Apply acquired skills in diagnostic testings, haematology, histopathology, to work in diagnostic or research laboratory. • Identify and create suitable employment opportunities in the area of animal welfare, zoos, museums, wildlife parks and conservation projects. • Undertake Career in the environmental, agricultural and pharmaceutical industries. • Start their our ventures and generate self employment in apiculture, aquaculture and sericulture. • Possess expertise which will provide them competitive advantage in pursuing higher studies. • Enhance lifelong learning knowledge and skills by the continuous professional development.