



SOMAIYA
VIDYAVIHAR

K J Somaiya College of Science & Commerce



"DISHADARSHAN" A ROAD AHEAD!!

SUBJECT GUIDANCE BOOKLET
FOR
SCIENCE STUDENTS

IQAC INITIATIVE
2020-21

MISSION

EQUIP THE STUDENT WITH KNOWLEDGE AND SKILLS OF THEIR CHOSEN VOCATION, INCULCATE VALUES, PROVIDE THEM OPPORTUNITIES FOR ALL-ROUND GROWTH AND PREPARE THEM FOR LIFE.

VISION

- TO EQUIP THE STUDENTS WITH ADVANCED KNOWLEDGE AND SKILLS IN THEIR CHOSEN VOCATION.
- TO PROVIDE VALUE-BASED EDUCATION AND OPPORTUNITIES TO STUDENTS. TO HELP THEM TO FACE CHALLENGES IN LIFE.
- TO NURTURE A SCIENTIFIC ATTITUDE, TEMPERAMENT AND CULTURE AMONG THE STUDENTS.
- TO CONTINUALLY REVIEW, DEVELOP AND RENEW THE APPROACH TO BUILD INDIA OF THE FOUNDER'S DREAM.

PROGRAM OUTCOME

AT THE END OF THREE-YEAR FULL-TIME UNDERGRADUATE BACHELOR PROGRAM IN SCIENCE (B.SC.) THE LEARNER WILL BE ABLE TO:

- DEMONSTRATE A FUNDAMENTAL UNDERSTANDING OF AN ACADEMIC DOMAIN, LEARNING AREAS, APPLICATIONS AND LINKAGES WITH ALLIED DOMAINS.
- USE KNOWLEDGE AND SKILLS REQUIRED FOR IDENTIFICATION OF PROBLEMS, COLLECTION OF DATA, ITS ANALYSIS AND EVALUATION TO FORMULATE EVIDENCE-BASED SOLUTIONS.
- COMMUNICATE THE RESULTS OBTAINED IN A STUDY WITH THE EXTERNAL WORLD.
- MEET ONE'S OWN LEARNING REQUIREMENTS ON THE BASIS OF CURRENT RESEARCH AND DEVELOPMENT.
- APPLY ONE'S OWN DOMAIN KNOWLEDGE AND SKILLS TO UNEXPLORED CONTEXTS.
- DEMONSTRATE SUBJECT-RELATED KNOWLEDGE AND SKILLS FOR JOB TRADES AND EMPLOYMENT OPPORTUNITIES.

INTRODUCTION

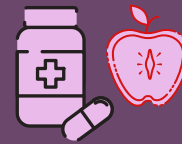
- Biochemistry is the branch of the life sciences devoted to understanding, with complete molecular detail, the mechanisms by which living organisms carry out their various functions. It is inherently interdisciplinary in nature and also fundamental to each and every branch of the life sciences and biomedical sciences.
- It is the most fascinating subject as it deals with the chemical language of Life, be it human, animal, plant or microorganism.
- Biochemistry is one of the most upcoming and highly demanding subjects in the Indian as well as the foreign universities.
- The basic foundation in Biochemistry is a necessary pre-requisite for any kind of biotechnological, medical, paramedical and biological research activity.
- At K. J. Somaiya College of Science and Commerce, Biochemistry is offered at T.Y.B.Sc. (3 units) presently in combination with Chemistry & Microbiology.

COURSE OUTCOME

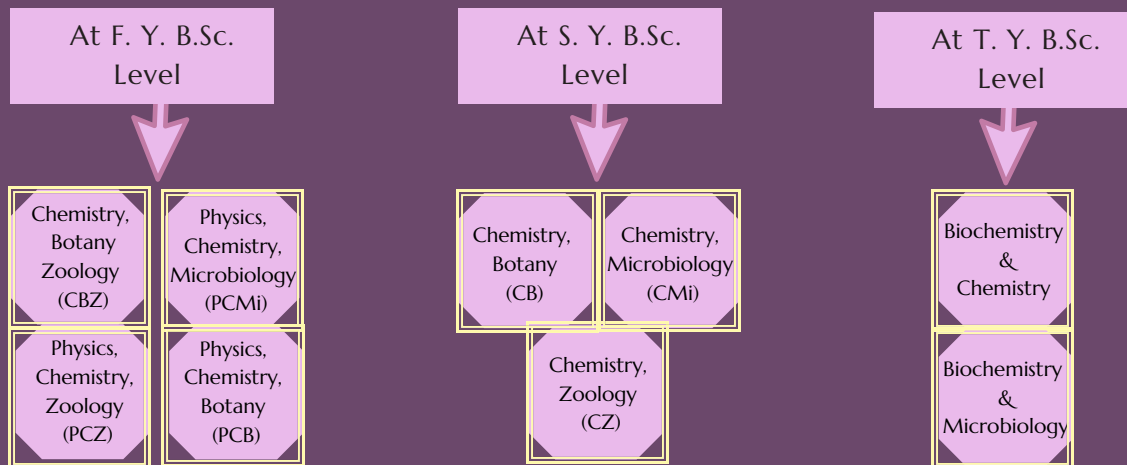
- Learners will be able to -
- Strengthen his/her base in the fundamental aspects of Biochemistry viz. Bio-organic and Biophysical Chemistry, Metabolism, Nutrition and Advanced Biochemical concepts viz., Genetics and Genetic engineering, Immunology, etc.
- To sharpen his/her practical skills in performing experiments involving latest protocols.
- To train his/her minds for gainful employment in industry, research-oriented career and qualifying examinations.
- To develop the scientific temper and interest by exposure through Internet, computers, various data bases and industrial visits and study/educational tours.
- To develop the human resource with the sound knowledge of the theory & practical in the discipline of biochemistry and the ability to apply this knowledge to the greater benefit of the society at large; through public engagement via presentations and outreach activities.



BIOCHEMISTRY



SUBJECT COMBINATION OPTIONS



EMPLOYMENT AREAS FOR BIOCHEMISTRY GRADUATE

- Food and Beverage Industry,
- Agricultural Industry
- Environmental Industry,
- Pharmaceutical Industry
- Cosmetic Industry
- Clinical Industry,
- Clinical diagnostics
- Biomedical Industry
- Forensic science
- Analytical Science,
- Biotechnology, Research and Development (R&D)



JOB ROLES FOR BIOCHEMISTRY GRADUATE

- Academician
- Research scientist
- Nutritionist
- Food scientist
- Geneticist, Biochemist
- Cytologist
- Clinical research specialist
- Patent attorney
- laboratory supervisor
- Regulatory affairs specialist
- toxicologist



HIGHER EDUCATION OPTIONS FOR BIOCHEMISTRY GRADUATE

- M. Sc. in Medical Biochemistry, Industrial biochemistry, Molecular Biology And Genetics, Nutrition Biochemistry, Food Science
- Ph.D



INTRODUCTION

- Graduation in Botany is a 3-year graduate degree program with the minimum eligibility.
- The course contains diverse range of fields; study of sustainable agriculture to entrepreneurship skills.
- Botany is one of the oldest branches of plant sciences.
- A study in Botany is as important today as it ever was. It provides not only hands on experience and professional input but it also develops analytical and commenting attitude.



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COURSE OUTCOME

- To deliver systematic knowledge about plant diversity, morphology and lifecycle of non-vascular and lower vascular plants to the learner.
- Learner will be able to create foundation for advanced studies in Botany.
- To expose them to the natural genetic variation in plants, study the biomolecules and understand its role in various metabolic processes.
- To make them aware about environmental factors, community patterns and ecosystem functioning.
- To make familiar with tools and techniques used in horticulture, traditional knowledge of medicine and formulate hair and skin care products and to create awareness about sustainable agricultural practices.

BOTANY



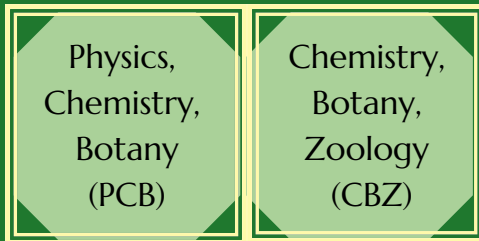
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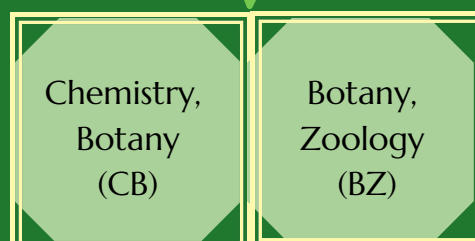
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SUBJECT COMBINATION OPTIONS

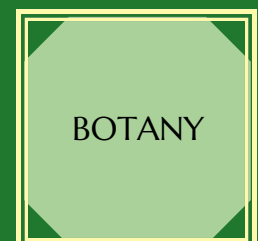
At F. Y. B.Sc.
Level



At S. Y. B.Sc.
Level



At T. Y. B.Sc.
Level



EMPLOYMENT AREAS FOR BOTANY GRADUATE



- Chemical Industry
- Land management Agencies
- Food Companies
- Seed and nursery Development
- Forest services
- Biotechnology firms
- Oil industry
- Arboretum
- Plant Health Inspection Services
- National Parks
- Plant Resource laboratory
- Educational Institute

JOB ROLES FOR BOTANY GRADUATE

- Plant pathologist
- Nursery manager
- Environment consultant, Ecologist
- Horticulturist
- Teaching
- Lab Technician
- Nursery or Green House manager
- Park Ranger
- Small Scale start-ups



HIGHER EDUCATION OPTIONS FOR BOTANY GRADUATE

- M.Sc.- Taxonomy, Cytogenetics and Plant Biotechnology, Environmental Botany, Plant physiology, Nutraceutical
- MBA-Agriculture, Pharmaceutical
- P G Diploma-Herbal Cosmetics and Perfumery, Nursery Management



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INTRODUCTION

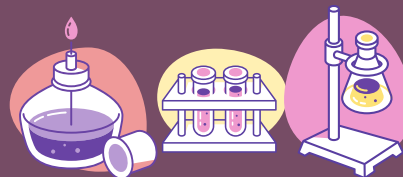
- Chemistry has become indispensable part of our day to day life. Probably, we are surrounded everywhere with chemicals, reactivity and consequently their conversion in to different products.
- The best way to exemplified the importance of it, is the body of all living organism which is mainly comprised of protein, fat, carbohydrate and minerals made up of basic constituent carbon, hydrogen, nitrogen, sulfur and water.
- In conclusive way chemistry has become an integral as well as inseparable fragment of our materialistic requirement i.e. matter.
- Basically, chemistry is the branch of science which deals with study of matter, their properties and the energy changes involved during any process.

COURSE OUTCOME

Learner would be able to:

- Understand the fundamental knowledge of various branches of chemistry (Inorganic, Organic, Physical, Analytical) and their inter-correlation to understand the basics of subject.
- To have concrete information about the reaction and their other possible pathway.
- To encounter with scientific problems with their subtle solutions
- To address out social, scientific and economic outcomes.
- To learn the basic Principles of the green chemistry and will be able to analyze role of chemical processes involved in different environmental issues.

CHEMISTRY



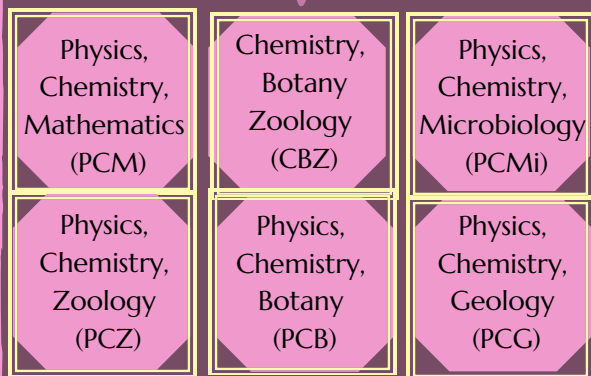
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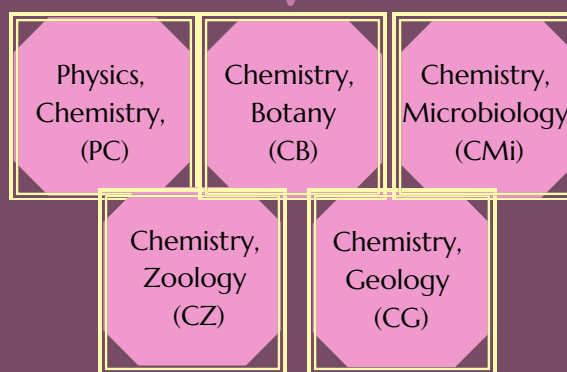
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SUBJECT COMBINATION OPTIONS

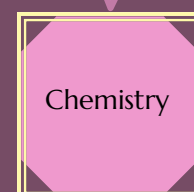
At F. Y. B.Sc.
Level



At S. Y. B.Sc.
Level



At T. Y. B.Sc.
Level



EMPLOYMENT AREAS FOR CHEMISTRY GRADUATE

- Academics
- Research
- Pharmaceuticals
- chemical Industry
- Polymer Industry
- Agrochemical Industry
- Forensic Science Department
- Oil and Gas sectors
- Cosmetic Industry
- Environmental Impact Assessment



JOB ROLES FOR CHEMISTRY GRADUATE

- Lab chemist
- Research Scientist
- Production officer
- Quality controller
- Health specialist
- Material technologist
- Teacher
- environment specialist



HIGHER EDUCATION OPTIONS FOR CHEMISTRY GRADUATE

- M.Sc. in General chemistry/ Analytical chemistry/ Organic chemistry/ Physical chemistry/ Drug chemistry/ Pharmaceutical chemistry/ Environment chemistry
- PG Diploma
- B.Ed / NET / SET / PhD
- MBA



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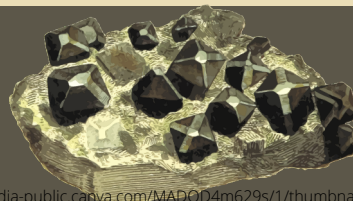
INTRODUCTION

- Geology is the study of Earth, which deals with its formation, its structure and composition and the type of process acting on it.
- Geology is concerned with the history of the earth over the course of its 4.5 billion year life. By studying the structures of the earth we can unlock its hidden past and anticipate its future.
- Geology deals with many issues which world is facing today, like climate change, water scarcity, and natural hazard.
- It also helps in development of a country, as most of the country's development is from the natural resources they have.
- Geology helps in the discovery of new mineral resources and its extraction. Geology also deals with the construction of mega structures like Dam and tunnels.

COURSE OUTCOME

- After the successful completion of the course, the learner will be able to:
- Learn various exogenous and endogenous earth processes that have been active throughout earth's formation.
 - Liberty to discuss and understand the man-made and natural disasters.
 - Appreciate that a geologist has an important role to play in identification and planning the future of our valuable mineral resources.

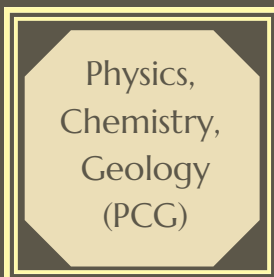
GEOLOGY



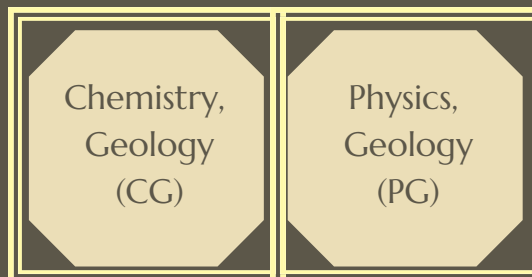
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SUBJECT COMBINATION OPTIONS

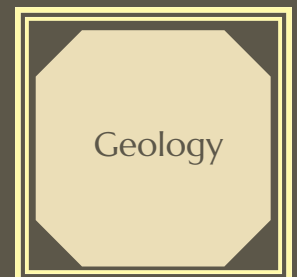
At F. Y. B.Sc.
Level



At S. Y. B.Sc.
Level



At T. Y. B.Sc.
Level



EMPLOYMENT AREAS FOR GEOLOGY GRADUATE



- In India, Geologists are recruited to the top positions as scientists/researchers in the government, industry and education sector.
- PSU's/ Government sector: Geological survey of India, ONGC, BPCL, ISRO, DRDO, Mineral exploration corporation Ltd, Coal India Ltd., Birbal Sahani Institute of Palaeosciences, many more
- Private Sector: Schlumberger, Cairn India, Shell, ESRI, Reliance, L&T

JOB ROLES FOR GEOLOGY GRADUATE



- Geologist
- Researcher
- Consultant
- Senior manager in mining industry
- Environmentalist
- Marine geologist
- Oceanographer
- Palaeontologist
- Volcanologist
- Assistant Professor.

HIGHER EDUCATION OPTIONS FOR GEOLOGY GRADUATE

- M. Sc - Geology/Applied Geology, Marine Geology, Geophysics, Petroleum Geosciences, Geoinformatics
- Integrated Ph.D in Geology (IISER Kolkata, IIT Kharagpur),
- PhD



INTRODUCTION

- Gauss, a German mathematician, aptly referred to Mathematics as 'The Queen of the Sciences'.
- This universal language has fascinated many mathematicians.
- Nature unfolds various aspects of Mathematics all around us.
- Mathematics is incredibly important in our lives.
- The laws of mathematics govern everything around us, and without a good understanding of them, one could encounter significant problems in life..

COURSE OUTCOME

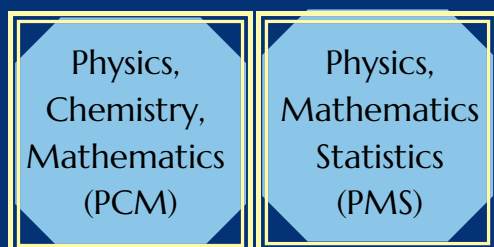
- After successfully completing the course, a graduate of Mathematics will be well equipped with a sound knowledge of Calculus , Abstract Algebra, Linear Algebra, Discrete Mathematics, Combinatorics, Number theory, Graph theory, Numerical Analysis, Financial Mathematics, Number Theory, Real and Complex Analysis and Metric Topology.
- The learner uses the logical thinking, problem-solving and decision-making skills, developed during the course to deal with all applications of Mathematics in various fields.

MATHEMATICS

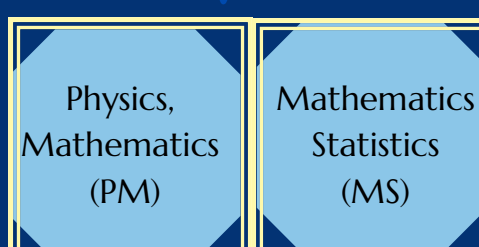


SUBJECT COMBINATION OPTIONS

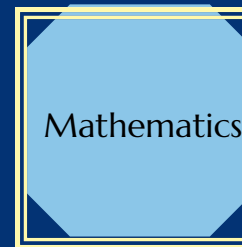
At F. Y. B.Sc.
Level



At S. Y. B.Sc.
Level



At T. Y. B.Sc.
Level



EMPLOYMENT AREAS FOR MATHEMATICS GRADUATE



- Research Institutes like TIFR Mumbai, IMSc Chennai, Harish Chandra Research Institute Allahabad, IISER Pune etc. offer good quality research for interested students.
- Military Operations
- Educational Institutions
- Insurance companies
- Actuarial Sciences
- Data Analysis/Operations Analysis/Project Development
- Banking

JOB ROLES FOR MATHEMATICS GRADUATE

- Research scientist/ Data scientist
- Market Researcher/ Investment analyst
- Software engineer- Programmer analyst/ Software tester
- Civil Service fast streamer
- Financial manager/ Financial trader
- Meteorologist
- Operational researcher
- Quantity surveyor
- Indian forest Service
- Algorithms engineer
- Geodesist
- Mathematical modeler
- Quantitative financial analyst



HIGHER EDUCATION OPTIONS FOR MATHEMATICS GRADUATE



- M. Sc Mathematics
- M. Sc Applied Mathematics
- Ph.D.
- MBA
- PG diploma
- M. Sc. Information Technology
- M. Sc. Computer Science
- MCA

INTRODUCTION

- Microbiology is a scientific study of the microscopic world.
- To the common man, Microbiology means the study of invisible mini wonders that only cause disease.
- In reality, the vast majority of microorganisms co-exist alongside us without causing any harm. On the contrary, many of them are required for our survival.
- It is a research oriented subject and plays a pivotal role in our daily lives.
- The syllabi for the three-year undergraduate programme are designed to enable the students to understand and select an area of their interest to build a career in Microbiology.

COURSE OUTCOME

After the successful completion of the course, the learner will be able to:

- State and describe the basic and advanced concepts of Microbiology.
- Perform practical techniques in Microbiology.
- Develop basic scientific approach towards a problem
- Apply the knowledge of Microbiology in Environmental Social and socio-economic domains.

MICROBIOLOGY



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SUBJECT COMBINATION OPTIONS

At F. Y. B.Sc.
Level



Physics,
Chemistry,
Microbiology
(PCMi)

At S. Y. B.Sc.
Level



Chemistry,
Microbiology
(CMi)

At T. Y. B.Sc.
level



Microbiology

EMPLOYMENT AREAS FOR MICROBIOLOGY GRADUATE



- Research
- Pharmacy
- Government or Private Food and Water Testing Laboratories
- Medical Laboratory
- Food Packaging
- Dairy Microbiology
- Cosmetic industry
- Fermentation Industries.



JOB ROLES FOR MICROBIOLOGY GRADUATE

After graduation one can seek a professional career as

- A Laboratory technician in an Instrumentation laboratory
- Officer in a Research Laboratory, Hospitals and Blood Banks, Public Health sector, Pharmaceutical Company,
- A technician in Food, Water testing and a Pathology laboratory..

HIGHER EDUCATION OPTIONS FOR MICROBIOLOGY GRADUATE



- M.Sc. Microbiology by Papers
- M.Sc. Microbiology by Research
- M.Sc. in a specialized branch of Microbiology
- Ph.D. in Microbiology
- MBA
- PG Diploma in Medical Laboratory Technology (PGDMLT) or other any other relevant PG Diploma.

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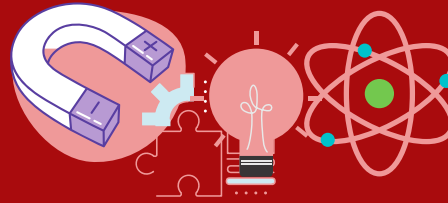
INTRODUCTION

- Every curious mind want to know the answer Why the things around the way they are? Scientific journey of finding the answer of these WHY is "Study of PHYSICS" which you will starting with this three year degree program.
- Physics explain reasons behind each and every natural phenomena/event happening around us.
- Physics is the science of energy, force and motion. Physics helps us to understand properties of matter, energy and their interaction in space-time regime.
- With study of physics we can try to understand the origin of atoms to universe and predict their behaviour.
- The laws and theory developed by physicist leads to the emergence of technologies like automobiles, space science, telecommunication, quantum computing etc.
- Physics is the stream which try to resolve the puzzles of nature and use this knowledge to develop new technologies to ease the life of mankind.

COURSE OUTCOME

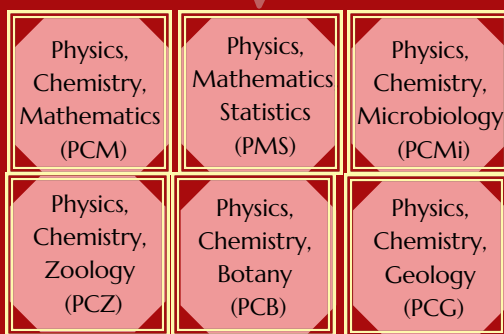
- After successful completion of course learner will acquire
- A thorough quantitative and conceptual understanding of the core areas of physics including mechanics, optics, thermodynamics, quantum mechanics, electronics at a level compatible with graduate programs in physics at peer institutions.
 - Ability to analyse and interpret quantitative results in the core areas of physics as well as interdisciplinary areas.
 - Skill to use contemporary experimental apparatus and analysis tools to acquire, analyse and interpret scientific data and communicate it effectively.
 - Ability to use contemporary experimental apparatus and analysis tools to acquire, analyse and interpret scientific data.
 - Develop analytical abilities to towards real word problem

PHYSICS

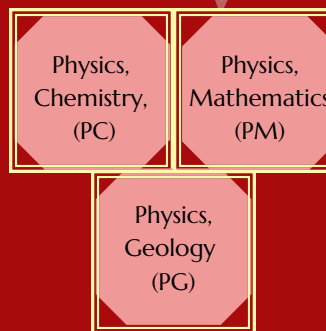


SUBJECT COMBINATION OPTIONS

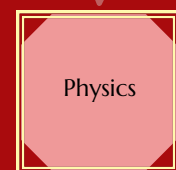
At F. Y. B.Sc. Level



At S. Y. B.Sc. Level



At T. Y. B.Sc. Level



EMPLOYMENT AREAS FOR PHYSICS GRADUATE

- Academics
- R & D sectors
- Science center and planetariums
- Scientific/medical instrument industry
- National defense forces
- Electronics/Automation industry
- Health care industry
- Software Industry



JOB ROLES FOR PHYSICS GRADUATE

- Teacher/Online educator
- Research scientist/assistant
- Marketing and technical support manager
- Officers/technical posts
- System designer/quality control manager
- Medical physicist/technician
- Developer/quality analyzer



HIGHER EDUCATION OPTIONS FOR PHYSICS GRADUATE

- M.Sc. in Physics/ astrophysics/ nuclear physics/ Acoustics/ electronics/ forensic science/ biophysics /Geophysics/ medical physics/ radiation Physics/Meteorology.
- Post graduate Diploma in Medical isotope techniques/ Nuclear medicine technology Embedded systems
- Integrated M.S.+ PhD from IISER, IIT, NIT
- MBA / MCA



INTRODUCTION

- Statistics is a science which deals with Collection, Classification, Analysis and Interpretation of data.
- The underlying philosophy of the B.Sc. statistics course is to develop theoretical and analytical skills of the students so that they may be absorbed in the corporate world or be able to pursue higher studies at the Master's level in Statistics.
- We are coming across data everywhere, every time. Analysis of data is required to be done to draw useful conclusions from it.
- You may be aware, a lot of data is generated nowadays. While browsing, data from every click is collected and that is used to draw valuable conclusions. Statistics provides tools to analyze this data.
- In the rapidly changing globalised market scenario, the need was felt to equip students with the capability to understand and handle the dynamic of statistics and the business world.

COURSE OUTCOME

After BSc Statistics, learner will be able to

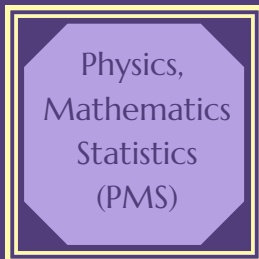
- Define statistical terms.
- Comprehend and visualize the data
- Use various statistical software to analyze data
- Create statistical models to solve real world problems
- Appreciate the beauty and crucial role of statistics in national development
- Develop the ability to use statistical knowledge and skills in other disciplines

STATISTICS

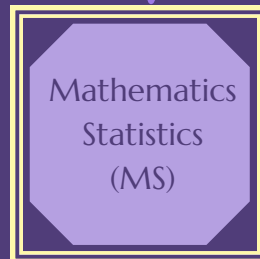


SUBJECT COMBINATION OPTIONS

At F. Y. B.Sc.
Level



At S. Y. B.Sc.
Level



At T. Y. B.Sc.
Level



EMPLOYMENT AREAS FOR STATISTICS GRADUATE



- Actuaries
- Banks
- Pharmaceuticals
- Software
- Data science
- Machine Learning
- Artificial Intelligence
- Biostatistics
- Market research

JOB ROLES FOR STATISTICS GRADUATE

- Statistician
- Business Analyst
- Risk Analyst
- Data Analyst
- Data Scientist
- Biostatistician



HIGHER EDUCATION OPTIONS FOR STATISTICS GRADUATE

- M.Sc. Statistics
- M.Sc. Applied Statistics
- Ph. D. Statistics
- Diploma courses
- Courses in Actuaries, Data Science, Machine Learning, Artificial Intelligence.



INTRODUCTION

- Zoology is not just a study of animals but also their interactions with the surroundings.
- In Zoology you will study causes and effects of these interactions from molecular to population level.
- Animal Kingdom is a large and diverse group. You will study different aspects of these heterotrophic living forms on Earth.
- You will learn their morphology (how they look), physiology (how they work), Reproductive biology (how they multiply) and also how they evolve.
- There are various other branches of Zoology which deal with application and vocational aspects.

COURSE OUTCOME

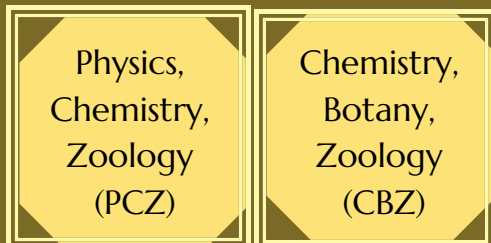
- The learner will be confident in the knowledge of various branches of Zoology and related soft skills that he/ she will obtain over graduation time.
- The learner will be able to carry out industry relevant research projects in Zoology
- The Learner will be equipped to clear competitive examinations in Life Sciences for administrative opportunities in Zoology.
- The learner will become aware about his / her role in ecosystem conservation and propagate sustainable development for a better tomorrow
- The knowledge and experiences gained during three years will make the learner a responsible citizen.

ZOOLOGY

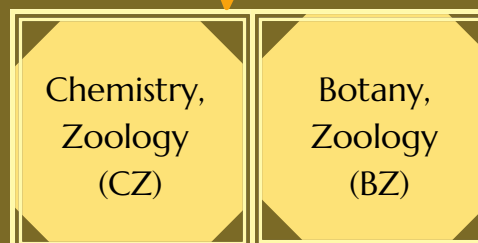


SUBJECT COMBINATION OPTIONS

At F. Y. B.Sc.
Level



At S. Y. B.Sc.
Level



At T. Y. B.Sc.
Level



EMPLOYMENT AREAS FOR ZOOLOGY GRADUATE



- Academics
- Research
- Forest administration
- Conservation
- Environmental impact assessment
- Museums/ Aquarium/ Zoological park
- National Parks and Wildlife Sanctuaries
- Fertility / pathology / toxicology labs
- Hospitals
- Life science industries
- Entrepreneurship-Aquaculture, Apiculture, Vermiculture

JOB ROLES FOR ZOOLOGY GRADUATE

- Teaching
- Research Project fellow / assistant
- Forest administrative officer
- Conservation intern
- Assistant curator at museum/ aquariums
- Naturalist in national park and wildlife sanctuaries
- Intern / project fellow at NGOs
- Lab assistant in fertility / pathology / toxicology labs
- Wildlife photography...
- Diet consultant in hospitals



HIGHER EDUCATION OPTIONS FOR ZOOLOGY GRADUATE



- M.Sc. in Oceanography/ entomology / physiology /neuroscience/genetics/ endocrinology/ biodiversity/ wildlife biology/
- Diploma in paramedical science / pathology
- B.Ed / NET / SET / PhD
- MBA in hospital management

THE CHOICE YOU
MAKE IN YOUR
LIFE WILL MAKE
YOUR LIFE....
CHOOSE WISELY!!

BEST WISHES!!

Thanks & Regards
Dr. Pradnya Prabhu
Principal