SCIENCE COURSES

The Science courses are dived into two categories: Natural sciences and Applied sciences. Natural sciences are the study of the Natural World, including Physics, Chemistry, Biology and Geology etc. Applied sciences, on the other hand, is the study of existing scientific knowledge and its application for human needs.

A Bachelor of Science degree is one of the clearest pathways for students who want to study science. The degree is based on understanding, reasoning and improving the natural world through systematic observation, experimentation, modelling and calculation. Lasting 3 years in India and 3 to 4 years in some countries, the course is commonly referred to as a Bachelor of Science. There are several fields that are almost always considered to be sciences and are thus awarded Bachelor of Science degrees. These fields include Biology, Biochemistry, Chemistry, Physics, Earth Science, Social Science, General Science, Mathematics, Sport/Exercise Science, Computer Science and almost all fields of Engineering. In the following pages, we will discuss the most famous subjects which are preferred by BSc. Honors students. Those subjects are Physics, Chemistry, Biology, Biotechnology and Biomedicine.

Physics

Physics, the mother of all sciences, engineering and technology, is the study of energy and the behavior of single atoms and their component pieces.

Physics is the framework on which every other science is built. The subject helps us to understand the nature of the universe and how the physical properties of matter relate to one another by formulating theories and experiments. Many careers strongly rely on a physics-related degree. It opens up vistas in Engineering, Technology, Architecture, Medicine, Veterinary, Agriculture and other allied science streams.

There are two types of options for students pursuing a Bachelor of Science degree in Physics. I.e. the professional option and the applied option. The professional option is intended for students who after graduate study, further advance their career field by pursuing a doctoral degree and opt to work in industrial or government research and development laboratories, or in teaching institutions.

The applied option is intended for students who plan to pursue a technical career in physics or other technical areas, usually without further study. Most of the Physics graduates are employed in diverse

Industrial fields, only a minority use their physics knowledge as part of their work. Those with physics degree are generally known as Physicists. A physicist can be either an experimentalist or a theoretician.

BSc. Physics helps students to explore and identify basic principles governing the structure and behavior of matter, the generation and transfer of energy, and the interaction of matter and energy. Applying their knowledge to areas such as developing advanced materials, electronic and optical devices, and equipment for a wide range of fields such as Medicine Technology, Mining, Astronomy and Geophysics.

Eligibility:

For admission to Bachelor of Science course in Physics, students must have completed their higher secondary examination in science stream and must have secured at least 55% percentage in their 10+2 examination. Although cut-offs may vary between 85-95% or even more in top institutes, other colleges or universities might accept a lower percentage as well.

Studies in Physics require a strong background in Physics and Mathematics. Some colleges might not allow students who had Biology in their subject combination to study BSc. Physics, therefore, it's better to keep the three major subjects as, Mathematics, Physics and Chemistry. Students can either opt for a general BSc. in Physics or can choose BSc. Physics Honors. Do recall the difference between an Honors degree and a pass degree.

Job Prospects:

There are a lot of career opportunities in the field of Physics. Graduates in this physics field are employed in schools, colleges, government and private organizations and in different industries. Other than these the graduates also have openings, both in public as well as private sector enterprises. They can apply for all governmental jobs that

insist graduation as the basic qualification. One can find various opportunities in governmental organizations like DRDO, VSSC, ISRO, SSPL, etc. They are also recruited in space research centers and in research laboratories.

Some of the common profile at which the graduates can work are:

- Researchers
- Consulting Physicists
- Associate Auditors (Physics)
- Proof Readers (Physics)
- Assistant Scientist
- Radiation Oncologists
- Radiologist
- Medical Physicists

They can also find employment in areas such as Atomic and Molecular Physics, Applied Electronics, Astronomy, Geophysics, Nuclear and Vacuum SciencesIf they want to pursue further education, there is a huge number of specialization options in an MSc. Degree, including

- Acoustics
- Applied Physics and Ballistics
- Applied Physics
- Bio Physics
- Engineering Physics
- Geophysics
- Marine Geo Physics
- Medical Physics
- Renewable Energy
- Astronomy
- Astrophysics
- Nuclear physics
- Vacuum Sciences
- Atomic and Molecular Physics

They can also do a Ph.D the fields mentioned above and get into research.

Top Colleges

- St. Stephens College
- St. Xavier's College, Kolkata
- Loyola College, Chennai
- Presidency College Kolkata
- St. Xavier's College, Mumbai

Chemistry

Chemistry is the study of the nature, properties and composition of matter,
and how these undergo changes, it is referred to as the Central Science. Chemistry is the science about basic structure of substances, i.e what they are made of, how they interact and what role they play in living things. Those working in this field are usually called chemists. These people study the numerous compositions of matter and its related properties. Those who study Chemistry search for new information about matter and the ways this information can be applied.

Bachelor of Science in Chemistry is a physical science course which studies various substances, atoms, molecules, crystals and other aggregates of matter whether in isolation or combination, and which incorporates the concepts of energy and entropy in relation to the spontaneity of chemical processes. The course helps the students in improving their diverse skills in various areas such as laboratory skills, numerical and computing skills, and an ability to approach the problems both analytically and logically. Students who wish to take up Chemistry at the undergraduate level, have two options to choose from; they can take up either a BSc Chemistry or else a BSc (Hons) Chemistry.

An undergraduate course in Chemistry can be of 3-4 years duration depending on the country that you choose to do it from. In India, it is a three- year course and has six semesters. Subjects that students would study in the course include the following:

Organic Chemistry, Inorganic Chemistry, Physical Chemistry,

Mathematics, and Analytical Methods in Chemical Analysis, Biochemistry and Environment Chemistry and likewise.

Eligibility:

The basic eligibility criterion for pursuing a BSc. Chemistry degree is qualifying 10+2 or equivalent examination in Science stream (Physics, Chemistry, Math or Physics, Chemistry, Biology) with a minimum of 50% marks secured in Chemistry subject and/or in aggregate from a recognized board of the country. However, the cut- offs may vary depending on the college. It may range between 87-95% and above that.

Selection to the degree course in these colleges is based on marks secured in
the final merit i.e. total marks aggregated in the final exams of 10+2. However, some reputed colleges and institutes also conduct entrance examinations to screen students.

Job prospects:

Chemicals are used in almost every field such as medicines, food products, and electronics and even in construction activities. This creates many opportunities for the chemistry graduates in diverse fields. The industries, especially chemical and pharmaceutical, the universities and government laboratories are the three major employers who recruit Chemistry graduates. With a bachelor's degree, students can apply for jobs in most of these areas, however, jobs in which research is involved will require post-graduation degrees.

The thriving chemical industry means there is a huge demand for chemists for various positions. Graduates in BSc. Chemistry can work as:

- Analytical Chemists
- Biomedical Chemists
- Lab Chemists
- Materials Technologists
- Production Chemist
- Production Chemist, also known as Manufacturing Chemists

- Quality Control Inspectors among many other options.

In the Public sector, the following organizations hire graduates in Chemistry:

- Indian Oil Corporation
- Government colleges
- Indian Space Research Organization (ISRO)
- Bhabha Atomic Research Centre
- Indian Railways
- Oil and Natural Gas Corporation (ONGC)
- Bharat Petroleum Corporation Limited

In the private sector, some of the many organization where BSc Chemistry graduates are usually hired are:

- Dabur
- Hindustan Lever
- Ranbaxy
- Dr Reddy's Labs
- Meyer Organics Pvt

The B.Sc Chemistry graduates have many options for their higher studies too. Some of the higher study options after Chemistry graduates are:

- M.Sc. Chemistry
- M.Sc. Analytical Chemistry
- M.Sc. Drug Chemistry
- M.Sc. Organic Pharmaceutical Chemistry
- M.Sc. Physical & Materials Chemistry
- Master of Business Administration (MBA)

Top colleges:

- St. Stephens College
- Christ University
- Loyola College
- Fergusson College
- Madras Christian College

Biology

Bachelor of Science in Biology is an undergraduate course concerned with the study of life and living organisms, including their structure, function, growth, origin, evolution, distribution, and taxonomy, function, properties and the entire study of the processes of all forms of life. B.Sc. (Biology) degree course includes the study encompassing the five unifying principles of Biology namely cell theory, evolution, genetics, homoeostasis and energy. It provides a complete training in the studies of organisms and their relationship to their environment. The duration of the course is three years.

Eligibility:

Students can either choose to pursue BSc in Biology (general) or take up BSc Biology Honors. The basic eligibility criterion for pursuing this degree is qualifying 10+2 or equivalent examination in Science stream (Physics, Chemistry and Biology) with a minimum of around 50% marks secured in Biology subject and/or in aggregate from a recognized board of the country. However, the cut-offs may vary depending on the college you want to pursue your bachelors. Some reputed colleges and institutes also conduct entrance examination to get admission to their B. Sc. (Biology) degree course.

Job Prospects

There are a lot of career opportunities in the field of Biology. Molecular biology and biotechnology are two the top most areas of employment.

Graduates in this degree can work in Agricultural Research Services, Biotechnology Firms, Botanical Gardens, Clinical Research Organizations and Farm Management Organizations. It should be noted that the majority of colleges in India offer specialized degrees of BSc Botany or BSc Zoology under this filed however some do offer the BSc Biology degree as well.

There are various higher study options available for an aspirant with a B.Sc. Biology degree. Some of the important higher study options in Biology that are generally chosen by the candidates who wish for a higher study in this field include the following:

- Master of Science in Biology
- Master of Science in Biological Sciences
- Master of Science in Applied Biology
- Master of Science in Conservation Biology
- Master of Science in Computational Biology
- Master of Science in Environmental Biology
- Master of Science in Environmental Microbiology
- Master of Philosophy in Plant Molecular Biology
- Master of Philosophy in Plant Biology and Plant Biotechnology
- Doctor of Philosophy in Biological Sciences
- Doctor of Philosophy in Plant Molecular Biology
- Master of Business Administration

Top colleges:

- Hindu College
- Hansraj College
- Christ University
- St. Stephens College
- St. Xaviers college, Mumbai
- Stella Maris college, Chennai

BSc Biotechnology

Biotechnology is a research-oriented science, a combination of Biology and Technology. It covers a wide variety of subjects like Genetics, Biochemistry, Microbiology, Immunology, Virology, Chemistry and Engineering.
Biotechnology makes use of biological systems and processes to manufacture useful products and provide services. Biotechnology has made everything possible and the new age biotechnology is all about genetic engineering and its applications.

A research-oriented field, biotechnology is a combination of Biology and Technology, which requires utmost dedication apart from having scientific and analytical temper, interest in research, observant attitude and determination.

If a person is passionate about improving the quality of people's lives through research, then this field will fit them perfectly. The BSc Bio- technology course is designed to provide students with a strong core science concepts and an application-oriented exposure in the field of Biotechnology.

Eligibility:

If we talk about eligibility for the BSc program, it varies from institution to institution. In some colleges, the eligibility criteria includes a 10+2 with 50%- 55% marks in Physics, Chemistry, Biology and/or Mathematics. Similarly, some colleges consider Physics, Chemistry and Biology combination of subjects as a basic entry level qualification and others take into account the x Physics, Chemistry and Mathematics combination.

However, the cut off may vary between 80-85% depending on the college.

Apart from BSc, Bio-technology study is also available as a Bachelor of Technology (B. Tech) course. Most of the colleges will conduct and entrance exam for admission to this course and the student needs to have Physics, Chemistry and Math as major subjects. In such a case very few institutions will allow students with Physics, Chemistry and Biology to be a part of the B Tech Bio-technology course

Subjects covered:

Communicative English	**Zoology**
Fundamentals of Statistics	**Immunology**
Fundamentals of Biochemistry	**Botany**
Fundamentals of Biophysics	**Chemistry-1**

Basics of Computers	**Microbiology**
Molecular Biology-1	**Plant Biotechnology**

Bio analytical Techniques	**Cell Biology-1**
Environmental Biotechnology	**Bioinformatics**
Animal Biotechnology	**Cell Biology II**
Entrepreneurship & IPR	**Molecular Biology II**
Recombinant DNA Technology	**Genetics & Genomics I**

Higher Study Options:

Once a student has earned a graduate degree in this field, they can go for the master's level (MSc, ME, MTech). For a Masters in Biotechnology, a student should either have a graduate degree in biotechnology or in any subject that is related to biological sciences. A graduate degree in subjects such as Biochemistry, Biology, Botany, Chemistry, Microbiology, Pharmacy, Veterinary sciences or Zoology is acceptable for an entry into a post-graduate program in bio-technology.

As it is a blend of numerous disciplines, you have to do a specialization in a number of fields. You can do your MSc in a specialized field of Biotechnology such as Plant Biotech, Bioinformatics, Genetics, and Molecular Biology. Some of the common areas of research include fields like: Agriculture and Agricultural Development, Animal Husbandry, Biochemistry, Biophysics, Botany, Dairy Technology, Environmental Protection, Fishery Development, Genetics, Horticulture, Medicine, Microbiology, Molecular Biology, Nutrition, Pharmacology, Tissue

Culture and Zoology etc.

A degree in bio- technology opens up to various careers opportunities.

To make a career in any of the fields of Biotechnology, one should have a sound knowledge in biological sciences, an under graduate degree in Biotechnology followed by a master's degree in the same field with required area of specialization. Pursuing PhD followed by post-doctoral research will definitely add value to the career.

Job prospects:

Students of Biotechnology can seek employment in chemical and textile industries, agricultural sectors, pharmaceutical firms and manufacturing industries, food processing, agro based industries and aquaculture.

Professionals in this career can also opt for teaching jobs in universities and colleges. Bio-technologists can seek employment in research laboratories, which are run by the government or the private sector.

Biotechnology graduates can work as Clinical Research Associates, Biotechnology Laboratory Technicians,, Crime Lab Technician, Biomedical Engineers, Biotechnology Research Associates, Quality control analysts, Quality control engineers, Senior research scientists, Environmental engineers, Biotechnology sales officers, Scientists (in Medical, R&D, Process Development), Clinical Lab technologists, Biochemists, Biophysicists, Microbiologists, Biomedical Engineers, Epidemiologists, Research Fellows in Academic institutions, private or government organizations.

Some of the famous companies which employ biotechnologists are:

- IDPL
- Thapar Group
- Hindustan Lever
- Biocon India Ltd.
- Hindustan Antibiotics
- Indo American Hybrid Seeds

Students can also pursue an MSc in Biotechnology and follow it with a Ph.D. if they are interested in higher studies.

Top colleges:

- Jamia Millia lslamia, New Delhi
- IIT Roorkee
- IIT Guwahati
- IIT Delhi
- IIT Kharagpur
- Amity University, Noida
- Bharati Vidyapeeth Deemed University, Pune
- Amrita University, Coimbatore

BSc Biomedical Sciences

Biomedical Sciences can be defined as the application of biology-based science for medical use, be it for research, health monitoring or treatment. BSc Biomedical Sciences students are trained to study the basic biological systems from a cellular, tissue, organ and whole-body perspective. From this basic knowledge, they are taught about the diseases that result when these systems go wrong as well as the diseases that are caused by the vast array of infectious organisms that we are exposed to every day.

BSc Biomedical Sciences is degree through which students get to understand a wide range of cellular, molecular and biochemical techniques including DNA and protein technology, live cell microscopy and analytical methods.

To get admission to a Bsc Biomedical sciences program, the candidate must have passed the higher secondary school certificate (10+2) examination with science subjects such as Biology, Mathematics and Chemistry.

In the course, students will study various subjects including Biochemistry, Cell Biology, Chemistry, Math, Current Topics in Biosciences, Bacteriology, Microbiology, Molecular Biology and Genetics, and Physiology etc.

The BSc Biomedical course is usually chosen by students who are interested in a career in the health services, in a pharmaceutical company or in medical research and who would like to explore the biochemical processes that occur in the human body, and particularly diseases like cancer or the response to infection.

Job Prospects

After completing graduation, Biomedical students, can work in various areas especially those which are directly connected with medicine. They can opt for teaching jobs in universities and colleges, in

Healthcare industries such as pharmaceutical industries, medical research, genetic engineering, lab technology and pharmaceutical sales.

Once qualified, many biomedical scientists work in laboratories for public and private sector. They can work in the Food Processing industry, or as Epidemiologists or Immunologist etc.

Apart from that, they can also work as:

- Surgeons
- Chiropractors
- General medicine practitioners
- Geriatric medical specialists
- Nutritionists
- Public health advisors
- Pediatric medical specialists
- Sports medicine doctors
- Toxicology consultants
- Bioinformatics researchers

Some of the popular companies in India which hire biomedical experts are:

- Biocon
- Serum Institute of India
- Panacea Biotech
- Mahyco Monsanto Biotech
- Rasi Seeds
- Novo Nordisk
- Aventis
- Indian lmmunologicals
- Venkateshwara Hatcheries

- Ranbaxy
- Dr. Reddy's Labs
- Piramal Healthcare
- AIIMS
- Bcs-lnsilico Biology
- Tata Memorial Centre
- Indian Society of Cell Biology

After obtaining a Bachelor's degree in Biomedical Sciences, students can also take up a Masters in several streams which include: Biochemistry, Molecular biology Biophysics, Cell Biology, Computational Biology and Bioinformatics, Epidemiology, Genetics, Immunology, Microbiology, Neuroscience, Oncology (cancer biology), Pathology and many other streams.

Top Colleges:

- Shaheed Rajguru College
- St. Stephen's College, Delhi
- St. Xavier's College, Mumbai
- Sri Ramachandra Medical College & Research Institute
- Acharya Narendra Dev College

With the advancement of age, there are multiple other fields that have come up for the students who have interest in Biology. Let us read about them a little here:

Forensic Science: Forensic science is the application of science to criminal and civil laws, mainly—on the criminal side—during an investigation. A major part of it draws from a lot a knowledge in Biology and allied fields. A bachelor course in Forensic Science followed by a masters can help the student land up with advanced career options such as Forensic Toxicologist, Polygraph Examiner, and a DNA Analyst etc.

Radiology: Universities have started to offer undergraduate BSc courses in Radiology to students who are interested. Radiology is the medical specialty that uses medical imaging to diagnose and treat diseases within the human body. At least a Bachelor's degree is important to start of the career. A masters and a post masters degree adds tremendously to the profile. For the starters the

profiles might start with Ultrasound Technicians and move on to Radiographer and even well-qualified Radiologists.

Epidemiology: Epidemiology is the method used to find the causes of health outcomes and diseases in populations. By definition, epidemiology is the study of the distribution and causes of health-related states and similar events (not just diseases) in specified populations (neighborhood, school, city, state, country, global). It is also the application of this study to the control of

health problems. An epidemiologist will usually have a bachelor's in a related science field, and master's degree in epidemiology. A master's degree in public health is highly desirable. You should have taken some advanced graduate coursework in public health, biology and statistics.

Apart from these, there are multiple other fields such as Medical Electronics, Medical Informatics, Gerontology, Biomedical Sciences, and Immunology etc. These fields also employ equitable skills of those students who go ahead and take Bio-Math in class 11 and 12.

KEY TAKEAWAY

- Science refers to a system of acquiring knowledge. Basically, the science courses are dived into two categories: natural sciences and applied sciences. Natural sciences is the study of the natural world, including Physics, Chemistry, Biology and Geology etc. Applied sciences, on the other hand is the study of existing scientific knowledge and its application for human needs
- A Bachelor of Science degree is one of the clearest pathways for students who want to study science. Students can either obtain a general BSc degree or specialize in one specific subject. The course is spread across 3 years
- The major subjects or fields students can specialize in a BSc degree are Physics, Chemistry, Biology, Biotechnology and Biomedical sciences
- hoosing science subjects in 10+2 and securing high marks in them is vital to be eligible to pursue a BSc degree
- After graduation, students can pursue a Master's degree in science or find employment in various sectors both private and public