

til 18 years of age and all higher government institutions and government-aided higher education institutions shall reserve five per cent seats for persons with disabilities, as well as

EMPLOYMENT NEWS

to persons with disabilities many of whom are excluded from existing services and programmes. Persons with disabilities shall not be discriminated against, have equal opportuni-

ties day in this form and shape. A person with disability is defined as a person with long-term physical, mental, intellectual or sensory impairment which hinder full and effective

the day in this form and shape. Disability caused due to Chronic Neurological Condition such as Multiple Sclerosis and Parkinson's disease; Blood

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CAREERS IN BIOINFORMATICS

Usha Albuquerque & Nidhi Prasad

Whether it is fighting disease, developing new seeds, or tackling pollution, Biotechnology is one of the fastest growing fields with its use and application in practically every aspect of daily life ranging from fields like agriculture to industry (food, pharmaceutical, chemical, bio-products, textiles etc.), medicine, nutrition, environmental conservation, animal sciences and so on. Bioinformatics is an emerging branch of Biotechnology that involves the use of software to utilize information from the vast biological database that is developed by experienced biotechnologists.

What is Bioinformatics?

Bioinformatics is the application of computer technology to get the information that's stored in certain types of biological data. Bioinformatics provides central, globally accessible databases that enable scientists to submit, search and analyse information.

It offers analysis software for data studies and comparisons and provides tools for modelling, visualizing, exploring and interpreting data. The main goal is to convert a multitude of complex



data into useful information and knowledge.

Bioinformatics approaches are used to understand the function of genes, the regulation of cells, drug target selection, drug design, and disease. Without quantitative analysis of the massive amounts of biological data generated by various systems, biology and -omics data cannot be interpreted or exploited.

Bioinformatics is a science field that is like but distinct from biological computation and computational biology. Biological computation uses bioengineering and biology to build biologi-

cal computers, whereas bioinformatics uses computation to better understand biology.

It can be understood as the line of study dedicated to the application of computer technology in the analysis and management of biological statistics. While the subject has had profound impact on every part of our living, it is recently getting considered as an important subject matter.

What is covered in Bioinformatics?

- Analysis and interpretation of various types of biological data including: amino acids sequences, protein domains and protein structures.
- Development of new algorithms and statistics.
- Development and implementation of tools that enable efficient access and management of different types of information, such as various databases, integrated mapping information.

Skills Required

In addition, the extensive knowledge of the run-of-the mill molecular biology packages (GCG, BLAST etc.), one needs to learn web and programming skills including HTML, Perl, JAVA and C++ and be familiar with a variety of operating systems (especially UNIX). **Relational** database skills are very much sought after. So, knowledge of SQL and a major database application such as Sybase or Oracle will be highly advantageous.

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BIOINFORMATICS ...

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One area of bioinformatics that is set to expand is the determination of relationships between structures and sequence. If one wishes to enter this field, one will need to learn about structural biology and modeling, mathematical optimization, computer graphics theory and linear algebra.

ELIGIBILITY

The basic educational qualification required to enter a programme in bioinformatics is 10+2 completed with science as a key subject. There are few Indian colleges which offers B.Tech in Bioinformatics. Most candidates get into this field after a bachelor's degree in biotechnology or other science courses. Those with B.Tech in bioinformatics are eligible to pursue bioinformatics in master and doctoral level at Indian and foreign universities.

Candidates who wish to apply for master's degree in bioinformatics must complete their bachelor's in any of the subjects such as B.Sc/B.Sc (Agriculture)/BCS/BE/B. Tech/MBBS/B. Pharma/BAMS/BHMS/B.V.Sc. Those who wish to go for advanced diploma in bioinformatics should have obtained a Master's degree or M.Sc. in Life Sciences, Physics, Chemistry, Mathematics, Biotechnology, Biophysics, Botany, Zoology, Biochemistry, Microbiology, Pharmacology, Computer Science or Equivalent), M. Sc (Agriculture) or M.Tech or MBBS.

Courses in Bioinformatics:

● Bachelor of Technology in

SCOPE

Job prospects for Bioinformaticians are applicable to a variety of sectors -

● Medical Applications:

1. Understand life processes in healthy and disease state
2. Genetic disease

● Pharmaceutical and biotech Industry

1. To find (develop) new and better drugs
2. Gene based or structure based drug design

● Agricultural Applications

1. Disease, drought resistance plants
2. Higher yield crops



Students completing a degree in Bioinformatics from premier institutes can be a part of leading IT firms. Many software companies recruit bioinformatics from time to time. Current biological and medical labs use methods that produce extremely large data sets, which cannot be analyzed by hand - for instance sequencing human genomes. Thus, modern biological and medical research and development cannot be done without bioinformatics.

Future applications are in biology,

- Content editor
- Bioinformatician

Bioinformatics is today seen as primarily applied to speeding up new drug discovery. But the other area that assumes increasingly higher significance is the application of IT to the entire life sciences sector for the same purpose it is done in other industrial sectors- improving efficiency, reducing costs, wider access, etc. For example, bio-diversity data management is an area that requires application of the best database design techniques and planning for data warehousing and data-mining. Knowledge management as applied to corporations will also become relevant in the scientific context to ensure that Indian scientists get relevant and timely information related to their research to help them network and collaborate to create new intellectual property.

Non-IT Scope

Apart from getting a job in the IT sector, candidates with the right skill set and knowledge can apply to pharmaceutical companies, biomedical organizations, biotech research centers, agricultural companies and even NGOs that need a bioinformationists. There is option to become an academician too after completing the studies.

Job opportunities in this field are available with research institutions, and with pharmaceutical companies, chemical industries, agriculture and allied industries working to expand the realm of information.

List of Institutes in India offering Bioinformatics

- Madurai Kamaraj University
- Bioinformatics Institute of India, Noida
- Bharati Vidyapeeth University, Pune
- Indian Institute of Information Technology (IIIT), Allahabad
- University of Hyderabad
- Bioinformatics Institute of India, Noida
- Jamia Millia Islamia University, New Delhi

(The list is indicative)

Top companies that hire Bioinformaticians in India

There are many Indian companies which have emerged as the leading recruiters in Bioinformatics. These include:

- Ranbaxy
- GVK Biosciences
- Torrent Pharmaceuticals
- Astra Zeneca Research Center
- Biscon
- Dr. Reddy's Laboratories
- Strand Life Sciences
- Cura Gen
- Celera Genomics
- Avestha Gengraine Technologies Pvt. Ltd.

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Courses in Bioinformatics:

- Bachelor of Technology in Bioinformatics (B.Tech in Bioinformatics)
- Bachelor of Science in Bioinformatics (B. E. in Bioinformatics)
- Master of Science in Bioinformatics (M. Sc. in Bioinformatics)
- Master of Technology in Bioinformatics (M.Tech in Bioinformatics)
- Master of Philosophy in Bioinformatics (M.Phil in Bioinformatics)
- Doctor of Philosophy in Bioinformatics (Ph.D in Bioinformatics)
- Advanced Diploma in Bioinformatics
- Diploma in Bioinformatics
- Post Graduate Diploma in Bioinformatics

done without bioinformatics.

Future applications are in biology, chemistry, pharmaceuticals, medicine, and agriculture. In addition, bioinformatics plays an important role in biomedical research. Research work in genetic diseases and medical genomics is rapidly increasing and the future of personalized medicine depends on bioinformatics approaches.

The various positions that a candidate can hold with a degree in bioinformatics are:

- Proteomix
- Scientific curator
- Researcher
- Sequence analyst
- Pharmacology
- Computational chemist
- Pharmacogenomics
- Bioanalysts

List of Institutes in India offering Bioinformatics

- Institute of Bioinformatics and Applied Biotechnology, Bangalore
- Jawaharlal Nehru University, New Delhi

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