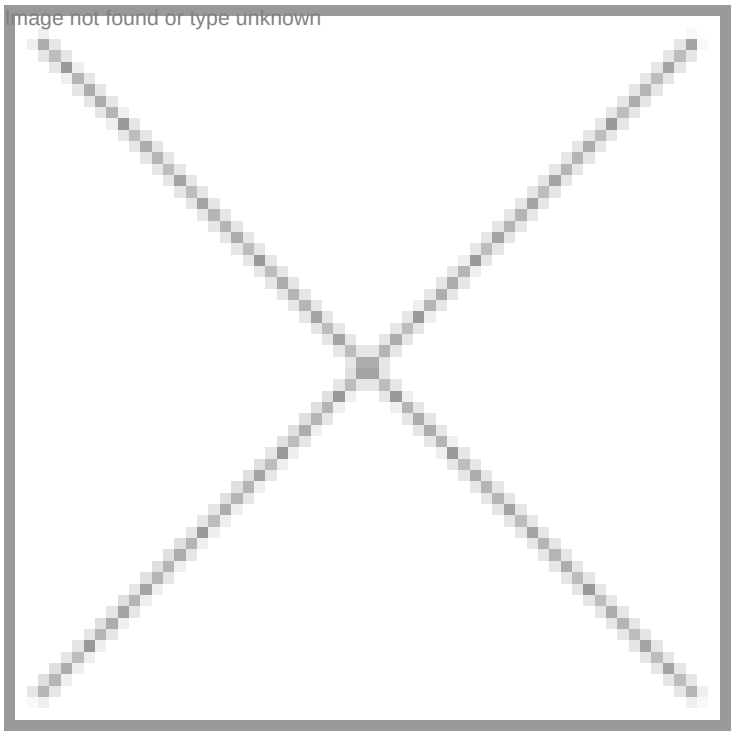
BioSpectrum the business of Bio & Health Sciences

Advice from biotech experts

11 January 2006 | News

Image not found or type unknown



Advice from biotech experts

On the Success Path

From its inaugural issue, BioSpectrum has been flooded with queries from thousands of students, mainly about career opportunities, course curriculum and future guidance in biotechnology. We have made an effort to put together some frequently asked questions (FAQs) by students and their replies as given by experts during our interaction with them.

Curriculum

Is the current curriculum adequate and if not what changes should be made? What should be the role of industry in driving curriculum modification?

Typically in any biotech course, about 1/3 of the education is completed in the college laboratory and the rest 2/3 is learnt hands-on, in the industry. The rate of obsolesce of biotechnology is very fast and the half-life of biotech knowledge is less than 3 years. So upgradation is necessary. No curriculum is adequate and it has to be constantly updated. The course requires frequent changes and the industry should be involved in designing the courses due to the technology factor. Today there are many technopreneurs who can give valuable inputs for the course content. They should be part of the advisory body of the universities/educational institutes and there should be professional chairs in the modern biotech institutes.

Students should come up as a body and demand changes. They should not entirely depend on the policy and course makers. Academics will always keep evolving. On an average technically Indians are phenomenal, but both the aptitude and attitude is important. Students should be assertive and ready to take risks. They should focus on individual development and cultivate managerial skills.

Should the focus be on Specialization or Generalization in the subject?

Both a broad generic base and focused knowledge are equally important in the biotech discipline. Biotechnology is not physics and chemistry, which is limited by boundaries. The education should be two-tiered. First a broad based providing the basic information about biosciences/modern biology should be built while the next tier should be very focused and job oriented. The bottomline is to breed excellence and not mediocrity.

Qualification

Should a student opt for a Bioengineering (BTech, MTech) or a Biosciences (BSc, MSc) degree in biotechnology?

Essentially, if one has an aptitude for innovation, an urge to develop something for mankind, only then should one get into the biotechnology stream. Bioscience courses are specialized programs with a focus on research and development. It equips a student to pursue further R&D in the area of vaccines, diagnostics, agriculture, etc whereas biosciences in synergy with mathematics and biology is bioengineering. It would constitute of, for example, a new process leading to a new technology, which ultimately leads to a new product. It is also the use of engineering principles to develop a niche area like the concept of plant bioreactors where biomass is used as a feedstock to develop products. BTech and MTech students are more suited for roles in the quality assessment/quality control, fermentation and production arena.

Is it necessary to have a doctorate degree or can one get good jobs after a Master's degree? What is the scope for an MBA biotechnology student?

The baseline is that there is no necessity of a PhD degree. With an MSc, MTech, BTech degree, one is equipped to do the routine activities like quality control, quality assurance, processing, production, downstream processing and fermentation whereas if one is looking at developing IPR for a company or go into innovative research, then it is preferable to have a PhD degree. Finally, it is your mindset, which is important and not the degree.

Similarly with an MBA biotech degree you are more equipped towards marketing, marketing analysis and business development activities.

Career Opportunities

How can a student plan his career after a degree in biotechnology?

There are basically three types of students: First those who look for higher education; Second, who opt for a job immediately after coming out from the college; and the third who look at becoming entrepreneurs. Students should have clarity in mind and focus on what they want.

For pursuing future research, there are large opportunities both in the academia and the industry. The various universities, national research labs, ICMR institutes and Centers of Excellence provide a wide variety of options for students looking at higher education. The core recombinant technology areas for research are agriculture, medical research and healthcare (including services), industrial biotechnology, environmental biotechnology, bioenergy and biofuels.

Students wanting to work in the industry can look at the areas of R&D, manufacturing, quality assessment/control, sales and marketing and marketing analysis. There are also a number of opportunities for working in the area of environment like the biological diversity arena. Since India is a signatory to the Convention on Biological Diversity, which is dedicated to promoting

sustainable development, we will need trained people in this area for the different regional offices to measure biodiversity, document its loss and extinction. The implementation of the biosafety measures will also require thousands of students.

Some of the other areas are working on new agrotech practices, novel pesticides and biofertilizers. A large number of knowledge centers are needed in the rural areas which will employ educated youth for transforming the farming practices and promoting the concept of biovillage. This is similar to the rural development program in China. So students can do wonderful work in the rural technology centers in smaller cities and towns. In this way, the BSc/MSc biotechnology students can play a useful role in the Rural Bioresource Council.

What are the opportunities available for biotech personnel in the private sector?

Today, there is a specific requirement of quality manpower for the third generation of biotechnology. Till now, many a times, it has been seen that good scientists hesitate to come to the industry. Budding biotechnologists should remember that the biotech industry is now involved in innovative research and development. Earlier companies were spending about 5-10 percent of the total turnover into innovative R&D but of late they are investing 15-20 percent of the total turnover into it. Though the Indian industry is still at a nascent stage of indigenous research and process development, its scientific environment (facilities) have been built consciously, which is very good. Students having an innovative bent of mind can enter this arena. Besides research there are openings at various levels like in quality control, marketing and sales, regulatory sector, technology transfer, clinical trials and in the bioservices segment (CROs).

Since the industry has become more competitive, it has specific human resource requirements, which it finds hard to fulfil. Presently, most of the students are like technicians and there is a great dearth of talent. It is important to remember that the industry is for profit and will identify the person based on his skills and attitude.

What is the advice for an aspiring entrepreneur?

There is great scope of technical entrepreneurship, in the biotech area. According to Jeffery Sachs, "Technology creates wealth". Today opportunity plus environment is equal to success. In today's times there is a focus on globalization and biology. If students have an entrepreneurial streak, they must start dreaming about their proposed venture early. And remember that every activity may require some route of development. They should identify the business opportunity, do the market assessment, consult people and gather a lot of information. For this, one should plan in advance. While pursuing their degree courses, students should identify 3-4 potential areas and zero down on one choice. Then identify a product in that area and develop, for instance, a process plant design. During the final year of study, work on a mini package and give the project a year's time to incubate. This entrepreneurship model is feasible and students should embrace it in large numbers.

For a start up bioservices is also an attractive option providing immense opportunities in areas like gene optimization, manufacturing process optimization, cell line characterizing among others.

Presently, students pursuing their biotech masters degree program do not understand anything about business-how to design a business plan, how to tackle regulatory issues, etc. There should be some capsulated program which given them an orientation in this area.

Future Direction

Which are the promising biotech sectors likely to see high growth in the coming 5-7 years?

If there is any area of science that will flourish after information technology, then it is biotechnology. There is proliferation of modern biology/biotechnology in all areas of life. The fields of diagnostics, vaccines, clinical trials, therapeutics are some of the upcoming areas. The development of kits, equipments in the services sector is equally important. In the next 2-3 years, the field of phyto/bioremediation technology may surpass the pharma field in the US and it will be a money-spinner. The area of bioprospecting has emerged and India has a genetic gold rush of bio resources, which require high throughput screening.

Now things are being looked at a molecular level. It is required to have interdisciplinary knowledge and experience to venture in the areas of molecular medicine. The era of genomics has started, with the sequencing of the human genome and specialized trained manpower in molecular virology, genetics, molecular immunology, stem cells, molecular immunology and molecular monoclonal antibodies are required.

In the next 5 years, according to American estimates there would be requirement of bioinformaticians. People with both bioinformatics and other biotech related skills are required and both have to work complementary to each other.

Today we have very limited human resource in the area of modern biology in India.

Along with these there is also a requirement of professionals with a masters qualification along with law or MBA.