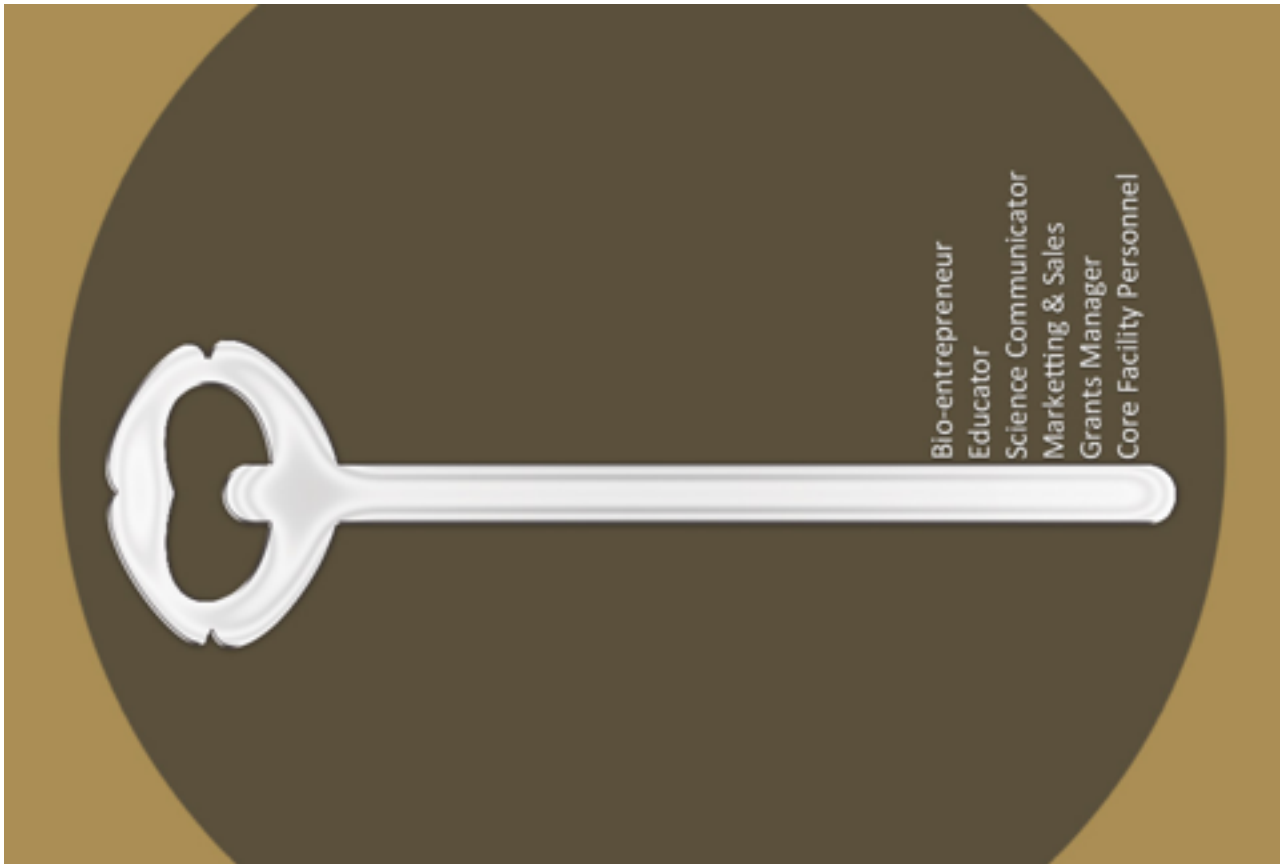

Careers in Science

Expanding the horizon



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Preface

A degree in science is often much more than just that—“a degree in science.” It is a set of abilities that are not limited to your understanding of the subject area but include a variety of other skills. Studying science helps you develop a scientific temperament, ask questions and understand a concept with logical reasoning. It allows you to become a thinker and teaches you to solve problems independently. You become a self-motivated individual. You also gain the ability to multitask. So many of these abilities can stand you in good stead the real professional world. However, before you enter the professional arena, the big question that you must answer is- *what do I want to do in life?*

It has been a norm world over that after graduating with a degree in science, you follow the path of academic research and eventually become an independent researcher making discoveries. However, the time has come when we should start looking at the bigger picture and understand that not everyone with a “degree in science” needs to become an independent researcher. With the qualities that you earn during your formative years, you can branch out in a variety of fields, so long as you are willing to apply your knowledge and skills in the right way. Today, a large number of avenues have opened up for science graduates where they can pursue their interests and succeed.

All you need to do is to be aware of your own strengths and weaknesses and have an open mind to look for these avenues. It requires some courage and boldness to change tracks from a conventional and well-travelled path to a path that is not well-explored and known, but the joy in traversing that path successfully is unmatched.

It is possible that at any given point, you may not know what exactly would you like to pursue, but that is okay. What is more important and may turn out to be more critical later, when you measure your success, is knowing what you don't want to do. You may have to explore your options and weigh out various different things during this journey but if you have the willpower and focus, you will surely succeed.

This e-booklet is an attempt to familiarise you with career options available to science graduates. These are just some of the options. The world out there is much bigger and filled with many more opportunities. So, seize your chance, make your niche and do not forget to enjoy the ride.

Smita Jain,

IndiaBioscience



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Bio-entrepreneur

The scientist whose research makes business sense

What is Bio-entrepreneurship?

If you have an innovative idea that can serve a need-gap and also generate commercial value, you can start your own venture and become a bio-entrepreneur.

The biotechnology industry in India holds about [2 percent](#) share of the global market. Several innovations, such as, 3D-printed liver scaffolds, biofuels from seaweed, stem cell products and nanotechnology-based drug delivery systems have come out of biotech startups.

What skills are required?

Entrepreneurs should be independent, willing to troubleshoot to find new solutions and be comfortable taking the road less traveled. Good soft skills and people skills can be an added advantage. Bio-entrepreneurs also need to be aware of intellectual property rights and regulatory affairs, especially if clinical trials are needed for their product.

How to start?

Once a product or service has been identified, you should make a detailed plan with target and goals. A patent application should be made before publishing the invention in journal paper or presenting in conference or other public talks. Usually, the process of product development involves unpredictable biological, technical and financial risks. Entrepreneurs must be prepared well for the long haul of product development. The average [time for commercialisation](#) of biologics, drugs, and other therapeutics is [10 to 15 years](#). Diagnostics, medical devices, and molecular tests reach the market in a shorter time frame from [6 to 9 years](#).

To maintain a growth trajectory and to complete the development process, entrepreneurs often have to raise a large amount of capital from venture and angel investors. Government funding is also available in the form of grants like BIG ([Biotechnology Ignition Grant Scheme](#)) and [Startupindia](#). In addition, these grants also provide mentorship support, networking opportunities, help with legal & regulatory compliance and guidance in accounting and fundraising.

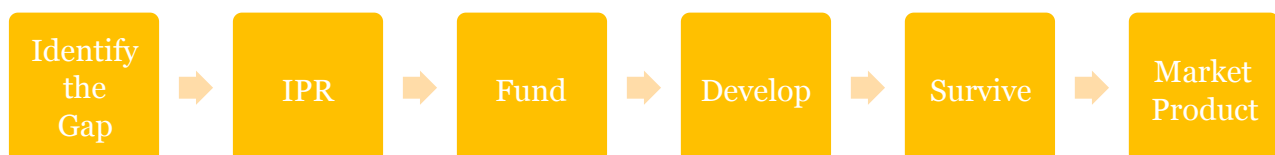


Figure 1: New venture creation process in the [Biopharmaceutical](#) industry (Modified from Paths to entrepreneurship in the life sciences, Bioentrepreneur, Nature)



Who can become Bio-entrepreneur?

A researcher who holds key patents or has performed some fundamental scientific work and possesses a new idea, can become an entrepreneur.

The [four most common backgrounds](#) of life science entrepreneurs include the following:

1. The scientist/physician/bio-engineer who comes from an academic institution (like a university, research foundation or a non-profit research institute).
2. The scientist/physician/bio-engineer who comes from within the life science industry, such as, from another biotechnology company.
3. A business person, such as, a former executive in the life science, pharmaceutical or venture capital industry, who is not a scientist/physician/bio-engineer.
4. A core group of individuals who were part of another life science organisation within the industry.

Useful links to explore:

[IIM-Bangalore, Executive Entrepreneurship Program](#)

[The Entrepreneurship Development Institute of India, Post Graduate Diploma in Management-Business Entrepreneurship](#)

[Government funding opportunities for startups](#)



Core Facility Personnel

Working with cutting-edge technology

What is Core Facility?

High-end technology platforms are essential for scientists to conduct cutting-edge experiments. Huge funds are required to establish, run and maintain such high-end instruments. At the same time an individual lab may seldom be able to utilise the full potential a technology or tool as its members would use the expensive equipment occasionally. As a solution to this problem research organisations set up core facilities where anybody from the scientific community can access the high-end technology platforms and in turn drive its optimal usage. Research institutions need dedicated staff– facility managers, scientists and technicians to run these facilities.

What skills are required?

Proficient in lab management, knowledge of current research methods & latest technologies, deep understanding of equipment operation & maintenance and comfortable with organising workshops/training programs.

How to start?

A degree in Ph.D. related to the core lab's discipline will be required to become facility director. For instance, deep knowledge in molecular biology will be required to work in next generation sequencing facility. Students with a Master's degree can join as technicians and trainees and climb up the ladder as they gain experience.

What does a Facility staff do?

Core facilities, maintain sophisticated equipment like flow cytometer, mass spectrometer, Electron microscope, Nuclear magnetic resonance spectroscope, Genome Sequencer and several others. These instruments are widely used by institutional scientific staff and other academic and industry-based scientists from outside the institute.

The professionals running and maintaining the facility provide hands-on training to new users, perform projects with defined goals, maintain equipment for efficient operation and analyse complex data.

Job opportunities

Research institutes with central lab facilities will have openings for various roles.

Useful Link to explore:

[NCBS Research Facilities](#)

[Rajiv Gandhi Centre for Biotechnology](#)



Educator

Shaping the future minds

Who is an educator?

An educator desires to share knowledge and inspire future generations of students. Their work involves an array of activities like teaching students, developing tools to engage students, developing modern learning methods, preparing the syllabus for class, hosting examinations and grading students.

What skills are required?

Critical thinking, communication, patience, a desire to learn and a basic comprehension of student psychology.

How to start?

After the postgraduate program in life science, you can appear for [NET](#) (National Eligibility Test) or [SLET](#) (State Level Eligibility Test) for appointment as Assistant Professors in universities or institutions. NET-qualified candidates can apply for lecturer role in institutes and colleges across India. SET qualified candidates can apply for lecturer post only in the state from where one has cleared the exam. One can also choose to apply for assistant professorship in Indian universities, institutes and colleges after completing Ph.D.

Job opportunities

One can start as an Assistant Professor which is full-time position or work part-time as a visiting teacher or work on hourly basis depending on requirement of the institute. Many online institutions are hiring professionals to teach online courses. You can create your own YouTube channel on a specific subject and upload videos, teach through Skype across continents or create educational videos and vend them over the internet.

How to become an online Educator?

Many teachers, professionals and subject matter experts are opting for online teaching where students and teachers interact via a recorded video, video chat or through online discussion posts. There are several advantages of using the internet– classes can be conducted from home, more students can be taught at the same time and there's the freedom of flexible working hours. The equipments required to set up a home studio are camera, microphone, good lighting with a suitable backdrop. Some skills will be needed to prepare a script, edit video and solve audio problems.

Useful Link to explore:

How to teach an online course

<https://www.udemy.com/how-to-teach-an-online-course/>



Grants Manager

Securing funding for meaningful research

What is grants management?

Grants management involves assisting universities and research organisation to seek funds for research and development. It involves screening appropriate funding source, writing proposal, finance management, report submission and program implementation.

What skills are required?

Grant managers must possess good domain knowledge so that they can comprehend the project and convey it precisely in the grant. Having a flair for writing and communication would be useful.

How to start?

Enroll in courses for in technical writing and grant & proposal writing. Contacts built at these courses can help with finding jobs later.

What will grants management involve?

It involves understanding the objective of the proposal, requirements of funding source, understanding the funding cycle and the timeline for submission. Once the grant is received, grants managers also need to plan for sustainability and growth of the project which entails report writing, meeting the funding agents and follow-up with partners and key stakeholders.

Job opportunities

Private and government funding agencies, such as India Alliance, DBT and DST have positions for grant managers. Other employers are business corporations, pharma companies and small & medium enterprises. Even biotech startups and budding entrepreneurs need grant managers to manage the funds obtained from the government. Some of the prominent research institute in India like NCBS, Bangalore and IISER, Pune have grants office that offers jobs to grants managers.

Useful links to explore:

Courses

[List of Free Grant Writing Courses and Training Programs](#)

Workshop

[Grant Writing Workshops](#) (Follow this page for latest programs)

Further Reading

[Writing a Grant Application for Funding](#)



Intellectual Property Rights (IPR) Professional

Helping researchers claim ownership of their work

Who is a patent agent?

A patent agent helps researchers draft and file patents to the Controller General of Patents. According to Indian Patent Act, 1971, one needs to pass the [Patent Agent Exam](#) to qualify as a registered patent agent. The mandatory requirements for becoming a patent agent are:

- Should be citizen of India
- Should have completed the age of 21 years
- Should have obtained a degree in science, engineering or technology from any Indian university
- Should have qualified the Patent Agent Exam conducted by the Controller General of Patents

The term Patent agent is often confused with 'Patent Attorney'. There is a clear difference in the qualifications and roles of both. A patent attorney has a degree in law and is entitled to deal with patent cases in the court. He is enrolled with a State Bar Council as an advocate and hence is called a patent attorney. Whereas, a patent agent has a degree in science or technology and is involved in patent drafting, filing and presenting it in front of the Controller General of Patents.

What skills are required?

A minimum of bachelors in science is needed to become a patent agent. However, it is not uncommon to see a patent agent with masters or a Ph.D. degree. A fair interest in reading, writing and drafting a technical document is expected. Interest in emerging technologies can be useful in understanding finer details about the patent being filed. A good understanding of client expectations, functioning of the patent market and awareness of current issues in patent litigation will help in the role.

How to start?

One can join a law firm as an apprentice to learn on the job while helping with patent applications and other tasks. Apprenticeship can start even before passing the patent exam.

What will it involve?

As per the Patent Act, a patent agent is entitled to practice before the Controller General of Patents. You will be responsible for preparing patent-related documentation and submit the application to the Controller General.



Job opportunities

One can work as a patent analyst in a law firm. Such analysts provide deep information about patent infringement and perform competitive landscape analysis of inventions and patents. They advise organisations on whether or not to file a patent, start R&D on a new product, or launch a product in a new territory or market.

Alternatively, one can also choose to work as a patent drafting specialist and help draft patent specifications, claims in a patent application and conduct prior art in patent databases.

Links to explore:

[Indian patent office](#)

Courses

[World Intellectual Property Organization \(WIPO\)](#)

[P.G. Diploma in Patents Law from NALSAR, University of Law, Hyderabad](#)

[N. C. Banerjee Centre for Intellectual Property Rights Studies, NALSAR](#)



Marketing and Sales Executive

Helping the market of science products achieve maximum growth

What is Marketing & Sales?

Both marketing and sales serve the common goal of creating revenue for a company albeit in different ways. Marketing is **defined** as “organised development, execution and control business activities to bring buyers and sellers together.” The goal of marketing is to generate interest in a new product or service to create prospective customers. Sales, on the other hand, focuses on converting potential customers to actual paying customers. Sales involve interacting with the interested customers to persuade them to purchase the product.

What skills are required?

- Familiarity with science and scientific products
- Marketing knowledge, like techniques for successful promotion and sales
- Business knowledge, budgeting, strategic planning and resource allocation
- Ability to interact with scientists to understand their requirements and help them make informed purchase-related decisions
- Knowledge of techno-commercial language
- Strong interpersonal skills and keenness to work in and manage cross-functional teams
- Should be detail oriented, have excellent planning capabilities and ability to actively listen
- Solid communication skills including presentation, verbal and written abilities are desirable

How to start

A Ph.D. graduate or master student with work experience in the life science industry can get into sales and marketing. Pursuing a MBA in marketing would be useful. To succeed in the industry as a marketing or sales professional, you must be constantly willing to remain up-to-date about industry trends and products.

Useful link to explore:

<https://indiabioscience.org/videos/alternate-careers/careers-in-science-at-iisc/path-ahead-science-and-market-together-rajesh-nair>



Industry R&D Scientist

Driving industries' research agenda

Who is an R&D Scientist?

Life science companies employ R&D scientists to develop applications, new products and improve existing products for commercialisation in healthcare, biotechnology, agriculture and environment sectors.

What skills are required?

Hands-on experience in recent cutting-edge tools in technology, in-depth subject knowledge and ability to work with technical and non-technical staff are needed. Eagerness to work effectively in an industry environment good time-management skills and the ability to define objectives and priorities will help.

How to start?

Network and interact with scientists and researchers from companies, discuss job requirements with current employees from pharmaceutical or biotech companies to understand the job role well and how it aligns with your interest.

What does an R&D scientist do?

Plans, organises and conducts research to ensure timely completion of allotted assignments and projects. Uses research data to create reports in form of powerpoint presentations, posters, study reports and publications. Co-ordinates with inter and intra departmental scientist and other stakeholders to ensure designs and products meet both customer needs and regulatory requirements.

Job opportunities

Work opportunities exist in privately held companies, startups or contract research organisations. Openings are advertised in newspapers, company websites, online job portals and LinkedIn.



Product Specialist

Acquainting researchers with the latest tools

Who is Product Specialist?

A product specialist helps improve market penetration of products and services specific to research. The main objective of a product specialist is to make potential and current customers aware of the products offered by their companies. They serve as a bridge between the customers and the production team. They work with clients from academic, pharmaceutical, and biomedical industry.

What skills are required?

A Master's degree in life sciences with some experience in a research laboratory or pharma industry or a Ph.D. in life sciences is desirable. Strong technical knowledge and lab experience in cutting-edge technologies is required. Good interpersonal skills, proficiency in oral & written communication and presentation skills will help in this role. The job involves travelling to customer locations to talk about new products developed by the company.

How to start?

Look for job advertisement on the websites of various biotech and pharmaceutical companies as well on online job portals.

What does a Product specialist do?

A product specialist helps introduce newly launched products and services to customers, shares technical information related to products and makes suggestions as per a customer's need. They also help execute the sales strategy to meet their company's sales targets, study competitor activity and update information on new products and technologies of interest to customers.



Science Communicator

Bridging the gap between science and the society

What is science communication?

Science communication involves communicating intricate scientific concepts, lucidly and accurately to people through a variety of mediums. Though scientists can themselves engage in science communication, it is fast emerging as a profession in its own right. A science communicator can express through the written medium, the audio-visual medium (think science films), photography or even illustrations.

What skills are required?

It requires a burning desire to tell stories about science, a willingness to understand different areas of science, being comfortable with short deadlines, interest in networking with people and seeking out contacts within specific organisations.

Depending upon the medium of communication the required skill set varies. A science journalist needs a flair for writing, a science-filmmaker needs to understand the process and tools of film-making, a science photographer needs to be comfortable with camera.

How to start?

Those interested in communication can gain experience by contributing work (articles/artwork/photographs/videos) for institute websites, campus magazines, organisational newsletters or local newspapers. Another good way to start is by starting a blog, where you can display your work. Take help of social media to spread the reach of your work. You can also seek internships with media outlets focusing on science.

Job opportunities

There are openings in research institutes to conduct outreach activity. Internships and jobs can also be sought with publications like Nature India, Down to Earth, Current Science.

Useful links to explore:

Workshops and courses

Anil Ananthaswamy and Peter Aldhous's science journalism workshop organised every year at NCBS, Bangalore ([2017 workshop](#))

[Workshop on Science Journalism at IISER, Pune](#)

[Workshop for Women in Science Journalism](#)

[M. Tech Course in Science Communication, National Council of Science Museum](#)

[Indian Science Communication Society](#) offers one-year course in Science journalism

[World Federation of Science Journalism course](#)



Competitions

M Krishnan memorial nature writing award– annual competition

EURAXESS science slam <https://euraxess.ec.europa.eu/worldwide/india>

[Fame Labs](#) competition organised by British council

Further Reading

<https://blogs.scientificamerican.com/guest-blog/effective-communication-better-science/>

<http://blogs.nature.com/naturejobs/2013/05/21/careers-for-scientists-away-from-the-bench/>

<http://cyberjournalist.org.in/courses.html>

Indian Science Writers Association <http://www.iswaindia.com/>



Science Manager & Administrator

Helping science run smoothly

Science Administration & Management are often looked at as same things but in reality, they are two different roles with different job profiles

Who is a Science Administrator?

A science administrator provides day-to-day administrative support to a scientific organisation, conducts administrative duties like managing contracts, keeping track of budgets, managing finance and grants, organising resources and developing scientific reports.

What skills are required for Science Administration?

- Ability to manage research projects
- Skill in formulating policy, developing & implementing new strategies and procedures
- Knowledge of budget preparation and fiscal management
- Knowledge and understanding of scientific research methodology
- Skill in organising resources and establishing priorities
- Knowledge of current and developing trends in research technology
- Ability to develop, plan, and implement goals
- Knowledge of laws and regulations
- Ability to provide technical advice, guidance, and support to professional staff

Useful Links to explore in Science Administration:

<http://www.sciencemag.org/careers/2003/08/my-path-career-science-administration>

<https://www.nature.com/scitable/topicpage/science-administration-elizabeth-prescott-13737285>

Who is a Science Manager?

A science manager works to support all research programs and activities in an organisation. They derive project plans, delegate tasks, monitor risks, network with the scientists and leaders, manage timelines of research project and communicate to funding organisations.

What skills are required for Science Management?

- Knowledge of latest research and ethical practices
- Ability to work in teams, resolve conflict and lead to achieve common goals
- Experienced in marketing, finance, and budgeting for science-based operations
- Knowledge of intellectual property in science-based operations
- Construct and evaluate project plans in accordance with regulatory and qualitative affairs standards



- To compose and present written and verbal information clearly and effectively to a variety of audiences

Job opportunities in Science Administration and Management

Look out for openings in government departments, universities, research institutes, health care organisations and non-profits engaged in research.

Useful Links to explore in Science Management

[Workshops on Science Administration & Management, organised by Newton Bhabha Fund, British Council of India.](#)



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