

Alternative career options in the biomedical industry: the professional science master's degree

David Finegold

Interdisciplinary degrees offer students another way to begin a career in the life science industry.

As advances in modern biology and genetic-based medicine continue to attract a growing number of students into the life sciences, the career options available after graduation expand as well, and now encompass the practice of medicine, academic and industry research, technology transfer, business development, law and finance, just to name a few. However, options for training beyond the undergraduate level have until recently been limited.

Becoming a medical doctor used to be the choice for many ambitious biology students. It offered them exciting work and professional autonomy in a well-respected and secure profession, with the chance to do good for society while doing well for themselves financially. Although most doctors continue to earn a very good living, the dramatic changes that have taken place in medical technology and the US healthcare system have made medicine a much less attractive option for many prospective medical school applicants. The shift toward managed healthcare has greatly reduced doctors' professional discretion and the time they can spend with patients, while increasing the time spent on paperwork and seeking reimbursement. These trends have reduced many doctors' job satisfaction and led some to question whether it is worth the huge debt and years of training required to become a physician.

For those who are primarily motivated by the search for new discoveries and finding solutions to unanswered questions about how the complex human biological system works, the most obvious route to becoming a scientific researcher is to obtain a PhD. This can be a very stimulating and rewarding career path;

however, it is not for everyone. Top doctoral programs are very competitive, with entry typically restricted to the most academically qualified graduates from the US and around the world. It typically takes on average 6 or more years to complete a doctorate, and PhDs often must go through several low-paying postdoctoral fellowships before securing an academic position. To keep those positions, PhDs must continue to compete aggressively for funding to support their research. Ironically, the most successful researchers often devote more time to grant writing, and managing and administering their projects than to making discoveries themselves.

In the past, students unsure of committing to a PhD elected to spend a few years working as a lab technician in academia or industry. Although this can help build new skills and give a more realistic preview of what a research career is like, drawbacks include the relatively routine work and lack of career opportunities for those without an advanced degree.

A new training route

What other options exist for students interested in building rewarding careers on the frontier of new discoveries in the biological sciences and medicine? The answer is until recently, not much. Unlike engineering, the biological sciences have not had a well-established and respected career path for individuals to obtain a master's degree and then put their new, specialized skills to use in industry. Typically, a student only got a master's in biology if he or she decided to drop out of a PhD program.

This situation has changed dramatically with the explosion in new professional science master's (PSM) programs (<http://www.science-masters.com>). From virtually none a decade ago, there are now around 100 PSM programs



Students at work in one of the Keck Graduate Institute's 14 laboratories.

spread across the United States. Most of these are new degree offerings from established research universities. Although the numbers of programs are growing, most are still quite small, offering specialized master's courses in areas such as bioinformatics or bioengineering. "Science faculty are realizing and beginning to enjoy the fact they can help educate people for important roles in society other than researchers and teachers," says Jesse Ausubel, a program manager at the Alfred P. Sloan Foundation, which has provided the primary financial support to launch new PSM programs.

The Keck Graduate Institute of Applied Life Sciences (KGI) (<http://www.kgi.edu>) was the first institution created specifically to offer a

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PSM. Launched in 1997 with a \$50 million grant from the W.M. Keck Foundation, KGI offers an interdisciplinary 2-year master's in bioscience (MBS) degree that combines the latest in molecular and computational biology and bioengineering with a mini-MBA and ethics training tailored to the life sciences. By integrating these different areas, KGI has created a learning laboratory for the creation of new bioscience businesses, with students working in cooperation with scientists and entrepreneurs on cutting-edge technologies and solving real-world problems.

Since admitting its first class in 2000, KGI has already spun out three companies. Students have been involved in all aspects of creating these businesses, from helping to develop the technology, to writing the business plan and negotiating the first supplier partnership. The first of these spinouts, Ionian Technologies (Upland, CA, USA), is based on a dramatic advance in amplifying DNA, an essential step in virtually all drug development and diagnostics, which represents a potential \$7 billion/year market. Ionian was recently awarded

two of the first dozen contracts granted by the US Department of Homeland Security and a major contract from the Defense Advanced

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Research and Planning Agency (DARPA) to use its technology to develop detection devices to combat bioterrorism.

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business development, technology transfer, product marketing, and clinical and regulatory affairs. In these jobs, individuals need to be able to analyze both the science and business side of an opportunity, to work in teams, and to communicate effectively with the different functions within an organization.

Conclusions

The ultimate test of professional science master's programs will be companies' willingness to hire these graduates and how quickly they are able to advance into leadership roles in the bioscience industry. Dennis Fenton, an executive vice president at Amgen (Thousand Oaks, CA, USA), which has already hired thirteen of KGI's graduates in eleven different departments, has little doubt about the value of this interdisciplinary education. "Success in biotechnology business depends on both an understanding of science and the practical business management techniques," says Fenton. "KGI's MBS degree is superb preparation for an individual who wants to translate the promise of science into products." ■