Cultivating a New Generation of Biomedical Entrepreneurs

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Scientia

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In recent years, scientific and technological advances have brought great innovation within the life sciences industry, introducing the need for entrepreneurship training for medical and engineering graduates. With this in mind, **Michal Gilon-Yanai**, **Dr Robert Schneider** and their collaborators developed an academic program designed to provide students and faculty members with the skills they need to become successful entrepreneurs. The team of collaborators includes **Dr Gabrielle Gold-von Simson**, an expert in implementing academic programs, and **Dr Colleen Gillespie**, who specialises in education, evaluation and dissemination science. Their pioneering program trains students on how to bring new biomedical technologies to the market.

A New Wave of Opportunities

Over the past few decades, there has been a rapid surge of new therapies, medical devices and digital health solutions aimed at improving the health of those affected by medical conditions. From robotic prosthetics to smartphone apps that monitor symptoms, these medical innovations have enhanced the quality of life of millions of people across the globe.

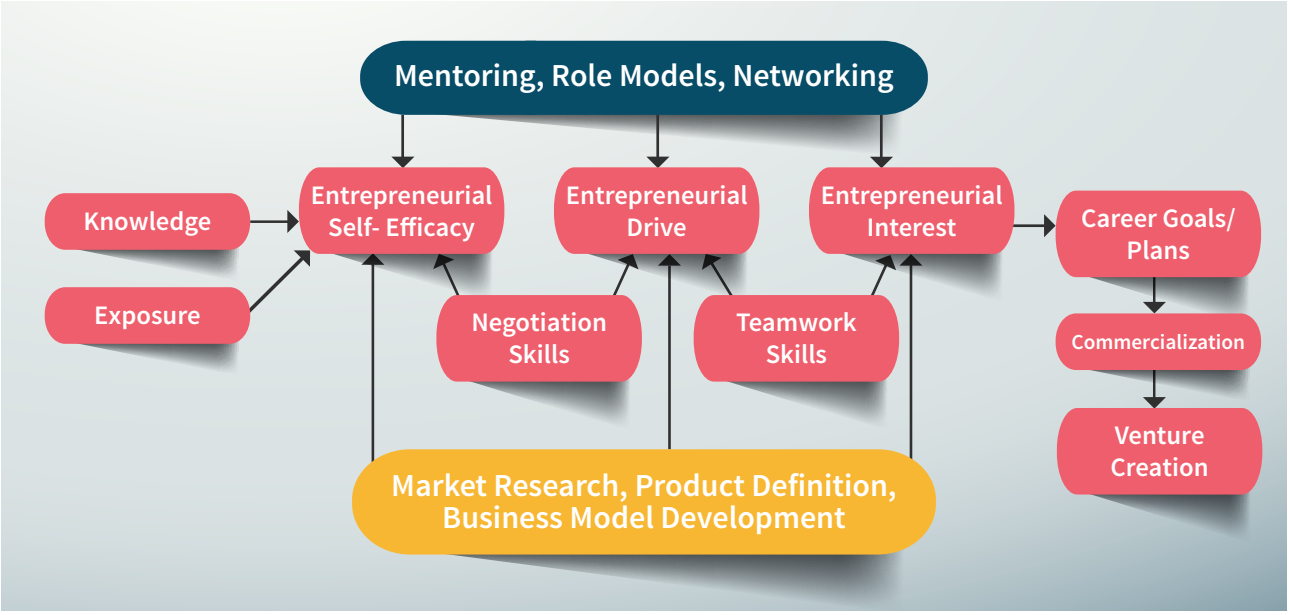
This rise in these innovative technologies and therapies has opened up new exciting possibilities for medical science and engineering graduates, broadening their career options and offering them the choice of starting their own business ventures. While knowledge of the biomedical sciences is highly valuable for developing a new medical device, therapy or service, launching a successful business also requires entrepreneurial skills, which are not typically acquired during traditional medical degree courses.

Therefore, a team of researchers at the New York University (NYU) Grossman School of Medicine has created an academic program aimed at providing postdoctoral and graduate students, as well as faculty, with the entrepreneurial skills they need to start their own business ventures. This academic program, called the Biomedical Entrepreneurship Skills Development Program, trains participants on many different facets of venture creation, using real projects as examples.

The Program

The Biomedical Entrepreneurship Skills Development Program builds on the success of a previous drug development educational program developed by Dr Gold-von Simson, in collaboration with her colleague Dr Ravichandran Ramasamy. It is ultimately designed to further expand the skill set of graduating medical and engineering students at NYU, teaching them to effectively translate the knowledge they have acquired into practical health solutions and commercial ventures.

'The goal of the Biomedical Entrepreneurship Program is to teach and train students in Biomedical Entrepreneurship, with a focus on the commercialisation of academic discoveries and inventions,' says Dr Gold-von Simson. 'Through a variety of methods, our hope is that participants will gain an understanding of the requirements for launching and building a new venture in the complex and highly regulated life sciences industry, as well as the entrepreneurial journey of the scientist entrepreneur.'



The program was devised by Michal Gilon-Yanai and several of her colleagues, including the new director, Dr Sadhana Chitale, who developed the curriculum and assisted its launch. Dr Colleen Gillespie, an expert on the evaluation and dissemination of academic programs, Dr Gold-von Simson, director of the health innovations and therapeutics program, and Joy Achuonjei, a NIDDK T35 scholar, have been working together to make improvements, evaluate the merits of the course, and measure outcomes with the intent of disseminating methodology to ultimately bridge the gap in research translation.

'The program focuses on advancing health innovations and developing effective solutions; this is at the core of the mentored, entrepreneurial process,' explains Dr Gold-von Simson. 'We aim to build upon the academic excellence at NYU with its track record of success.'

Advancing Research Translation into Business Ventures

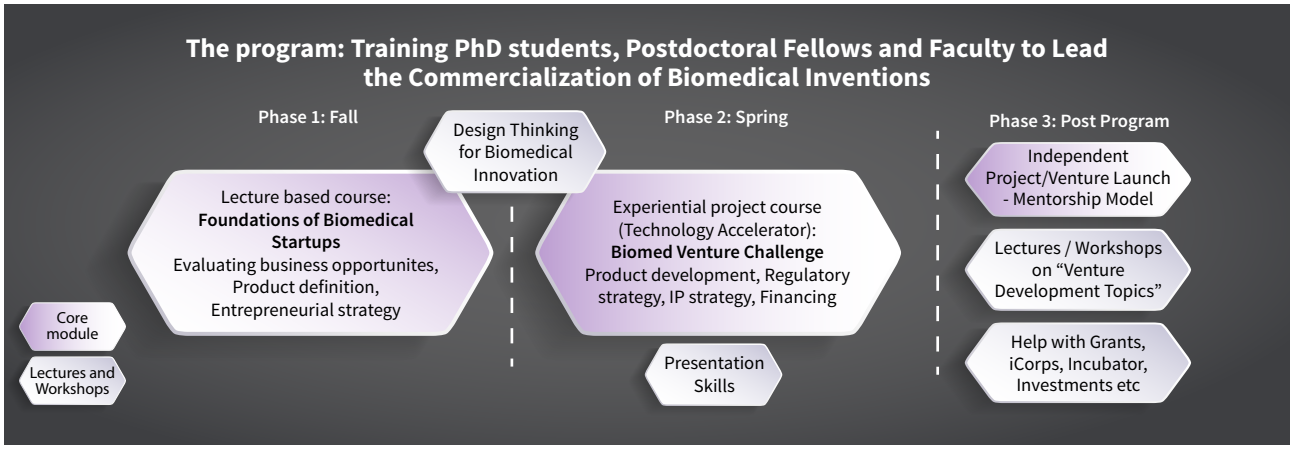
'Our program aims to promote commercial development of novel discoveries and breakthroughs, while leveraging early-stage researchers with innovative and creative ideas,' the team says. 'The goal is to teach scientists and like-minded individuals at an early career stage how to create solutions, whether at the molecular level or via the creation of medical devices or software tools, to benefit those who suffer from disease.'

So far, the Biomedical Entrepreneurship team has devised a series of curricular activities that span across one academic year. These activities are each designed to teach participating students how to translate their knowledge of medical science and engineering into promising and successful business ideas, such as novel therapies, medical devices, health-related mobile apps and other digital healthcare tools.

'By introducing participants to the similarities and connections between the biological mechanisms underlying diabetes, metabolic disease, and other medical conditions, we enable and encourage them to think creatively about potential applications for their own research from seemingly unrelated disease contexts, such as autoimmunity and hyperimmunity, cancer and inflammatory diseases, ultimately advancing the goals of the National Institutes of Health,' the researchers explain.

The core course offered as part of the Biomedical Entrepreneurship Skills Development Program is 'Foundations of Biomedical Startups'. This course gives students an overview of the process by which a medical product makes its way onto the market, through a series of lectures and case studies delivered by faculty members, experienced entrepreneurs, and investors. The first piloted course in this area was offered in 2017 and was called 'Introduction to Biomedical Entrepreneurship'. In fall 2019, after several adjustments and a course name change, 'Foundations of Biomedical Startups' was offered and approximately 50 students enrolled.

In the spring of 2019, students were also given the opportunity to take part in a competitive technology acceleration program called the 'Biomed Venture Challenge', which was subsequently offered online in the spring of 2020 due to the COVID-19 pandemic. Working together in teams, the participating students applied the knowledge and skills they had acquired in lectures to develop business models and commercialisation pathways for new medical technologies. Several industry experts were then called upon to evaluate the students' inventions. The team that received the most positive feedback won an award of $30,000 USD, which was to be invested in advancing their technology towards commercialisation. The program is funded by industry sponsors Pfizer Inc, Kairos Ventures and Wilson Sonsini Goodrich & Rosati.



A third component of the Biomedical Entrepreneurship Skills Development Program at NYU is a workshop called 'Design Thinking for Biomedical Innovation'. The main aim of this workshop is to introduce students to the concept of design thinking, which is an approach often used by entrepreneurs when they are trying to come up with innovative projects.

Evaluating the Program's Impact

The complete Biomedical Entrepreneurship Skills Development Program in its current form was first offered during the academic year spanning from the fall of 2019 to spring of 2020. To evaluate its impact, participants in the Foundations of Biomedical Startups course, the Design Thinking for Biomedical Innovation Workshop and the Biomed Venture Challenge were asked to complete surveys that elicited their feedback on these activities, assessed their biomedical entrepreneurial skills, and explored the impact of participation on their future career and research plans.

Overall, the students who attended the core course and Biomedical Innovation workshop provided highly positive feedback, suggesting that the topics were interesting and the sessions were taught well. Most survey respondents found speakers highly engaging, particularly those who delivered the Therapeutics and Venture Creation lectures. They also offered feedback on how certain modules could be improved, noting that speakers could place more emphasis on the practical aspects of technology development.

The team also tested students' assessment of their own entrepreneurial knowledge and skills before and after they attended the Foundations of Biomedical Startups course and found that based on their self-assessment, their knowledge of venture creation and their entrepreneurial skills had significantly improved.

Students who took part in the Design Thinking for Biomedical Innovation Workshop reported that their understanding of the three key topics covered during the workshop – design thinking principles, design thinking methods, and knowledge of diabetes and chronic kidney disease – had greatly improved.

Perhaps most importantly, all participants agreed (somewhat or strongly) that the Foundations of Biomedical Startups course made them more likely to pursue commercialisation, better able to collaborate with those seeking to develop drugs, and more likely to conduct high-impact research.

A Successful Initiative

The Biomedical Entrepreneurship Skills Development Program has so far proved to be highly successful in introducing students to biomedical venture creation, while also teaching them to translate their knowledge of the medical sciences and engineering into innovative and potentially profitable business ideas.

In the future, the program could serve as an inspiration for other medical schools that are considering introducing courses or programs focusing on biomedical entrepreneurship. The team is now planning to share the curriculum they developed with other academic centres in the US, towards facilitating the creation of similar academic programs.

Since they were awarded the grant a little over a year ago, the research team focused most of their efforts on developing the course curriculum, implementing it, and conducting a preliminary evaluation of the program. Although the COVID-19 crisis caused a series of disruptions, meaning that much of the course needed to be delivered online, the feedback received from participating students has been highly positive.

In the upcoming year of the program, The Biomedical Entrepreneurship team plans to forge deeper collaborations with both the Business School and the School of Engineering at NYU, in order to encourage interdisciplinary innovation amongst students and faculty. Additionally, as teams that include diverse perspectives have been shown to lead to greater innovation, the researchers also plan to encourage the participation of more students from underrepresented minority backgrounds.

Meet the researchers

Dr Gabrielle Gold-von Simson
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Dr Gabrielle Gold-von Simson is the Medical Director of the Paediatric Acute Care Unit at the Hassenfeld Children's Hospital at NYU Langone and an associate professor at the NYU Grossman School of Medicine. She holds an MD and MSc in Clinical Investigation from the NYU Grossman School of Medicine She is a practicing paediatric hospitalist and is Director of several academic modules and labs, including the Health Innovations and Therapeutics Program, and the NYU CTSI Clinical Research Centre.

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Dr Colleen Gillespie is an associate professor at the NYU Grossman School of Medicine. She holds a PhD from New York University and conducts research at the intersection between medical education and health services. In addition to overseeing the evaluation of the academic curriculum at the NYU Grossman School of Medicine and designing and implementing evaluations of innovative medical education projects, she specialises in assessing the competence of physicians and how they communicate with patients.

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Michal Gilon-Yanai
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Michal Gilon-Yanai was until recently associate director of the Biomedical Entrepreneurship Program. She holds an MBA from the MIT Sloan School of Management, a BA in computer science and LLB in Law from Tel Aviv University. Before joining NYU, she managed two entrepreneurship programs at MIT: the Entrepreneurship Educators Forum and Translational Fellows Program. Prior to her academic career, Gilon-Yanai worked at iMDsoft, a healthcare IT startup, where she gained management experience and a better understanding of real-world business challenges. She is currently an executive venture partner at Two Lanterns Venture Partners.

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Joy Achuonjei
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Joy Achuonjei is a medical student at The Zucker School of Medicine at Hofstra/Northwell. She holds an MS and a BA in Neuroscience from Columbia University. Her current research interests include medical education, innovation and initiatives to help underrepresented medical students develop entrepreneurship skills. As an NIDDK T35 summer research scholar, she worked with Dr Gold von-Simson and the Biomedical Entrepreneurship team. Achuonjei is also a member of the national working group for White Coats for Black Lives.

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Daniel Cobos holds a BA in Psychology from St. John's University and began working at NYU in 2013 as a project associate and clinical trials assistant and subsequently joined the NYU CTSI as an administrative coordinator of the NYU CTSI's Translational Research Education and Careers Core. He also facilitates other NYU educational programs such as the Drug Development and Health Innovations and Therapeutics Program and serves as the coordinator of the NYU Biomedical Entrepreneurship Program.

Dr Sadhana Chitale
The NYU Grossman School of Medicine
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Dr Chitale holds a PhD in Microbiology from the University of Mumbai and an MBA from the University of Pittsburgh. She is the new Program Director of the Biomedical Entrepreneurship Program as well as the Senior Director of Life Sciences/Technology Transfer in the office of Industrial Liaison within NYU's Technology Venture and Partnerships. At NYU she is involved with the management of intellectual property and technology transfer. Previously, Dr Chitale was a Licensing Manager at the Weill Cornell Medical School; she is also a Certified Licensing Professional and a registered patent agent.

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KEY COLLABORATORS

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