"Pioneering beyond Pandemics"
Commencement Address by Dr. Noubar Afeyan
Boston University Advanced Degree Commencement Ceremony
May 16, 2021

President Brown, Chairman Feld, members of the Board of Trustees, faculty and administrators: Good morning, and thank you for inviting me to take part in these ceremonies.

To the family and friends watching online from around the world, thank you for being with us, and for all that you did to help and support the graduates we honor today.

And finally, to the Boston University students receiving advanced degrees this morning: congratulations! This is your moment… a moment that marks the culmination of years of hard work … a moment that is a portal to your unwritten future and to new possibilities.

It is my great honor to speak to you on this special occasion and to receive a degree from Boston University alongside you.

A little more than a century ago, a young man was sitting where you are. He graduated from BU in 1918 and was set to pursue a PhD in zoology.

But World War One was ravaging Europe. He enlisted and was sent to Kentucky for training.

Soon after, a deadly flu pandemic that had been coursing through countries abroad arrived here in the United States. He got sick and wound up in the camp hospital.

There were no doctors, and fellow soldiers were pressed into service as nurses. When he asked for water, he was offered moonshine.

90% of the camp got the flu, and many did not survive. Every morning several hundred coffins were lined up outside the hospital.

Lying in the infirmary, he decided to rewrite his future. He abandoned zoology and became a doctor. He went on to become one of the world's leading medical experts on radiation.

He founded the Cancer Research Institute at the Beth Israel Deaconess Medical Center -- just a mile and a half from this stadium -- and served as its first Chief of Pathology. He helped build the field globally.

That young man was Shields Warren, the grandson of Boston University's first president. He served as a trustee of BU for 30 years, and Warren Towers is named in honor of the contributions he and his family made to this institution.

Looking back on his life, he said that seeing so many people suffer and die in a pandemic helped him learn to disregard fear. His fearlessness aided his pursuit of groundbreaking science.

Your commencement comes during the largest global pandemic since Shields Warren earned his Boston University degree. 100 years later, in the midst of an equally devastating pandemic, Shields Warren's example carries lessons that still endure.

For one, follow the science. When COVID-19 hit, Boston University as a whole responded with urgency, with strategy and with impressive science. BU built an unprecedented testing system capable of monitoring your campuses with a dedicated lab and 8 robots capable of processing 600 tests per day, more than one million tests to date. Science assisted in keeping you safe so that you can graduate today. **I commend everyone involved with this complex undertaking for their pioneering work.**

Fearlessness in pursuit of impact drove Shields Warren and also drives us at Moderna, the pioneering company in mRNA medicines, which created and developed a life-saving vaccine faster than any in human history.

Last January, just two days after we knew the genetic sequence of the novel Coronavirus, we had the design of our mRNA vaccine, and just 42 days later we delivered the first doses to the National Institutes of Health for testing.

The first Moderna shot went into a volunteer's arm in Seattle on March 16, 2020. We tested the vaccine with a diverse group of 30,000 volunteers, and nine months later the FDA authorized our vaccine for emergency use. Three days after that, the first Moderna vaccines were administered to front-line health workers.

As we stand here today more than 250 million doses of mRNA vaccines have been administered in the U.S. And now, with emergency authorization from the WHO and a new partnership with COVAX, we will soon begin sending 500 million doses to the world's lowest income countries.

When we founded Moderna in 2010, many doubted that messenger-RNA could be turned into medicine…. but we imagined a future in which it **was** possible. Over 10 years, we figured out how to make that future a reality.

The development of these vaccines and their rapid deployment demonstrate what's possible when we imagine new realities, innovate with urgency and move beyond conventional wisdom. In the ongoing battle against COVID-19, Moderna became a pioneer.

My message to you, graduates, is much the same: You can imagine the future you want and **pioneer your way to that new possibility, for yourself, and for the world**.

I keep using the word pioneer or pioneering - What do I mean by that?

For me pioneering means being willing to be the first to explore uncharted territory …. seeking something unproven, and being willing to withstand the adversity that comes with it. To walk into the unknown and all of its challenges, in pursuit of greater possibility.

We don't always have a choice about becoming pioneers; but COVID-19 has made it a requirement. You figured out virtual classes, built relationships over Zoom, juggled being a parent or an employee, did research with new socially-distant protocols. You are finishing your advanced degrees amidst a pandemic that has forced you to pioneer your way to a diploma in ways never seen before.

The question I want to ask you is this: after today, and after the pandemic, will you remain a pioneer?

Your work touches every aspect of our lives -- Engineering, Music, Teaching, Literature, Theology, Art, Law, Science, Business, Medicine and Health, Social Work, … and the critical arenas where these disciplines cross --- data science, urban health, and work to build a more just and tolerant society. Will you keep pioneering in your chosen fields, or even create completely new fields?

As you launch your professional lives, I believe your experience of becoming pioneers out of necessity can serve as an enduring force to keep on pioneering throughout your life – but this time pioneering by choice.

I want you to consider what pioneering can bring to your life, your work, and our world.

Right across the river, 34 years ago, I got my PhD degree in biochemical engineering, which was then a completely new field. Back then, Biology was as far away from my BS in chemical engineering as it could get.

After MIT, I was fortunate to start a life of innovation and entrepreneurship and stayed in Boston. This community's emerging tech ecosystem, combined with its preeminence in medicine and biomedical research, offered the promise of a fledgling industry blending those two fields, now known simply as "biotech."

Since founding it in 2000, I lead a company called Flagship Pioneering, that builds **companies to transform human health and sustainability**. Essentially, we are a company that systematically invents and builds new companies based on breakthrough innovation. To our knowledge, it is the first such effort to do, as a single institution, what is typically done individually by lots of separate startup entrepreneurs.

Together with my 200 colleagues, what we do at Flagship is highly improbable and often scary. Figuring out how to make breakthrough innovations and entrepreneurship repeatable has been a non-stop challenge. We constantly experience the discomfort of what some call, "the learning-edge."

Over the last decade, life on the learning-edge has led the team at Flagship to found more than 60 companies pioneering new areas of life science.

Today, I want to share a few principles that have guided me on my pioneering journey. First, get comfortable being uncomfortable. Second, don't fear rejection. Third, lead with curiosity.

The **first principle of pioneering** is to get comfortable being uncomfortable.

A formative aspect of my life has been immigration. It is the history of my father's family -- fleeing the Armenian Genocide in 1915, then fleeing Bulgaria when a communist regime took over, and eventually settling in Lebanon. And it is also my experience - fleeing civil war in Lebanon in 1975, settling in frigid and cosmopolitan Montreal, then moving to (comparatively) balmy Boston.

All of this movement brought me and kept me outside my comfort zone. To be sure I am not suggesting you have to go through these experiences to become accepting of discomfort, just find what pushes you in your own life experience.

I decided my career path when I was your age, and in hindsight I believe it was heavily influenced by my immigration across countries and disciplines. I was drawn to inventing things and to the prospect of creating new realities.
I founded my first company in 1987 at the age of 24, and have been inventing in the life sciences since.

Whatever success I have had – I owe in part to discomfort and outright fear.

Being uncomfortable is familiar to many of you – those of you from communities who have not historically had access to higher education - those of you who have had to scale language or visa hurdles to claim a seat in your classroom - those of you whose background or circumstances suggested it was not realistic to receive the degree you receive today.

Navigating across disruption – in geography, language, economics, culture and religion -- enriches your understanding of the world and hones your ability to listen and translate across disparate ideas.

And the future will only bring more disruption more discomfort.
So I encourage you to embrace change and leave your comfort zone.

And when you find yourself getting comfortable, leave it again!

The **second principle of pioneering** is about rejection.

Do not be afraid to accumulate rejections. It seems counterintuitive… but disappointment can be one of life's hidden advantages. It is the fear of failure that creates a culture of inhibition…and prevents us from taking risks. Set aside the fear of rejection, and you'll be more ambitious.

When you start a business, you face a lot of rejection. The first company I started, I made almost every mistake there is to make – but it worked out well in the end. And although I'm known for the companies that have succeeded, there were others that failed. To be successful, you have to be comfortable with disappointment, day after day. Week after week.

As we like to say at Flagship, if you collect enough "no's," you must be getting closer to a "yes."

We founded Moderna to pursue medicines that had no precedent, academic or industrial. We did not know we would develop vaccines. We climbed up a mountain for a decade, and we faced plenty of rejection.

And when Moderna found itself in the spotlight last year, many people thought we would not succeed because we weren't an established pharmaceutical company.

Your future will require greater resilience.

My advice to you: Dismiss conventional wisdom. Know that rejection is the companion of original thinking. Do not let rejection stand in the way of your ambition, let it motivate you on the road to success.

The **third aspect of pioneering** is an enduring curiosity.

At my company, there are two words that start every pioneering exploration: "What If?"

We ground ourselves in relentless curiosity. We ask questions that often take courage and years and years of work to pursue.

- What if we could teach a patient's own cells to produce proteins that could prevent, treat or cure diseases?

This is the far-out question we asked ourselves a decade ago. The eventual answer – messenger RNA – became the breakthrough behind today's COVID vaccines.
Continue to ask: "What if?" That is the thinking that leads to discovery. Keep your imagination nimble. Seek out colleagues who will join you in remaining curious and asking courageous questions. The only path to new solutions for our society is to follow those "what if?" questions.

We created Flagship Pioneering to ask: "What if?" and to build companies that shape the answers into breakthrough innovations that improve lives. I've talked to you about Moderna today, but we continue to take many more leaps toward the unknown.

Let me share with you some of the more provocative challenges we are working on now!

What if our health system was designed to keep us free of disease, not just care for us when we are sick?

What if you could be alerted to disease in your body before it advanced, just as you are alerted to traffic ahead on the highway?

What if a simple blood test could reveal pre-cancer long before a tumor actually developed?

What if the scientific community worked together to build a global system to rapidly develop and deploy new vaccines to shield us from future pandemics? What if our governments invested in pre-emptive medicines and our health security as much as they do in our military security?

We are imagining a revolution in health care to focus on protection and early detection instead of reaction and treatment. And at a time when many doubt science, let me state clearly: **I believe in science and its capacity to help deliver that revolution**, just as today it is leading the way to defeat COVID-19.

There will certainly be more viruses that spread across the globe, but we also face other pandemics -- heart disease, Alzheimer's, depression, diabetes, addiction. These are widespread, global threats that I believe can be detected much earlier, and hopefully, prevented.

This radical, pioneering future has implications for all of you – the health care providers, scientists and engineers, but also the experts in policy, race, law, education, psychology and human behavior. A future of health security will need your expertise, your curiosity, and your courage.

The pandemic has forced us to make more conscious choices about the type of world we want to live in. One hundred years ago Shields Warren saw death and chose to dedicate his life to preventing suffering. He also dedicated much of his life to building this institution, that today graduates more than 3000 advanced degree recipients into the world.

It also turs out that Shields Warren went on to pioneer throughout his life in ways he couldn't have imagined when he chose to follow medicine.

In addition to having a profound impact on the field of cancer research, he was one of the first to research the biology of radiation effects. His research led to health and environmental safety recommendations on the use of radiation. His investigations in Nagasaki and Hiroshima led to the establishment of the Atomic Bomb Casualty Commission. He advised on the human consequence of atomic testing and became the first Director of the Biology and Medicine

Division of the Atomic Energy Commission. NASA called upon him to establish safety limits to protect astronauts from radiation.

So, graduates: Let this past year affirm your capacity for innovation in the face of the unknown. Harness your education to imagine the impossible and be the kind of pioneer who relentlessly pursues a better world.

Boston University's own commitment to pioneering has prepared you for the journey ahead. You've been blessed with faculty who are committed to groundbreaking research and passionate teaching. You've honed your craft in a vibrant city that is a center for intellectual thought and technological discovery. You've been exposed to a truly global community that pursues knowledge with tenacity. Your BU education will help you ask "what if?" in a world that needs your solutions.

Channel your pioneering spirit to leap toward exciting unknowns, rejecting conventional wisdom, staying uncomfortable, braving uncertainty, all along asking: "What if"?

I am here to tell you: it's worth it. **The most important discoveries are made where no one else is looking.** And the results can be life changing – not just for you, but for all of humanity.

Go forth, pioneers, Boston University graduates, and good luck.