



SCHOOL OF BIOMEDICAL ENGINEERING

Faculties of Applied Science & Medicine

SBME CONVERGENCE 2020





MESSAGE FROM THE DIRECTOR

This is such an exciting time for Biomedical Engineering. Our ability to design and build new technologies that help us better understand human biology—and that have the potential to impact health and healthcare—has come so far, and SBME is happy to be pushing it even further.

In January 2020, we released our **Five-Year Strategic Plan** that defined the school's ambitious goals while articulating a set of core values that have become the filters through which we run all decision making and development across school activities and programming. We envision a world where biology and technology work seamlessly to improve health and healthcare for all (not just a few), and we are building that world by becoming Canada's hub for cutting-edge BME education, innovation and research.

Since the SBME's inception in 2017, we have grown significantly. It was three and a half years ago when we launched UBC's first UG BME program, led by Associate Director Peter Crompton and in 2021, we are graduating our first BME students. We've built partnerships with the BME community through hospitals, universities and industry. We've launched our venture hub and created an ecosystem of people and expertise that allows us to understand problems and advance solutions across biological scales from molecular design through to human physiology and beyond.

Responding to COVID-19 was an all-hands affair across our education, research and industry mandates. Our teaching faculty put considerable time and resources into maintaining the quality of our classes in the virtual space. Due to their efforts, we still mobilised a number of new courses while maintaining our established programs, which have continued to prepare our students to become leaders in translational medicine.

With a foundation like this, it's hard not get excited for the future. In 2021, we will continue to grow our faculty roster, finalize the design of our new home, Canada's Living Laboratory, work toward accreditation, deploy our new brand and website, and hire passionate, driven people to help propel us forward. All of this and more, you'll read about in the pages ahead; and to those who made it possible—including our exceptional leadership team of Drs. Karen Cheung, Peter Crompton, Fabio Rossi and Payam Zahedi—you have my profound gratitude.

Without further preamble, please enjoy this overview of the amazing things the people of SBME have achieved, what they've built, and where we're going next.

Welcome to SBME Convergence.

Peter Zandstra, PhD, FRSC, FCAHS, PEng

Canada Research Chair in Stem Cell Engineering
Director and Professor, UBC School of Biomedical Engineering
Director and Professor, Michael Smith Laboratories





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WHAT'S NEW





NEW FACULTY



Dena Shahriari, PhD
Assistant Professor

Dr. Shahriari is developing implantable neuroelectronic devices, sensors, and smart biomaterials.



Calvin Kuo, PhD
Assistant Professor

Dr. Kuo uses musculoskeletal modeling, wearable sensors and human motion to better understand and treat brain injury.



Zachary Laksman, MD
Assistant Professor

Leveraging stem cell models, Dr. Laksman is exploring the genetic basis for heart muscle disease and improved personalized therapies.



Jenna Usprech, PhD
Assistant Professor of Teaching

Specializing in cell and tissue engineering, Dr. Usprech designs undergrad curriculum focusing on retention, critical thought and wellness.



Nika Shakiba, PhD
Assistant Professor

Dr. Shakiba's work focuses on cell competition and engineering stem cell therapies using synthetic biology.



Nozomu Yachie, PhD
Associate Professor, Canada
Research Chair in Synthetic Biology

Dr. Yachie uses cell engineering and high performance computing for DNA event recording and cell lineage tracing.



David Liu, MD
Associate Professor

Through advances in interventional radiology and non-invasive imaging, Dr. Liu is working toward improved blood clot management.



NEW FACULTY

CONTINUED



Gabrielle Lam, PhD
Assistant Professor of Teaching

A specialist in tissue engineering, biomaterials and regenerative medicine, Dr. Lam is working to integrate experiential learning in all course design.



Carl de Boer, PhD
Assistant Professor

Dr. de Boer works with genomic big data to decipher genome regulation and susceptibility to common inherited diseases.



Manu Madhav, PhD
Assistant Professor

Dr. Madhav is working to better understand the algorithmic role of neural circuits in behavioural control.



Carolina Tropini, PhD
Assistant Professor

Dr. Tropini studies the human gut microbiome using imaging, microfluidics and more to understand and treat IBD.



Anna Blakney, PhD
Assistant Professor

Through cellular and molecular engineering, Dr. Blakney is optimizing RNA design and formulation to improve immune response.



Ali Bashashati, PhD
Assistant Professor

Utilizing machine learning, informatics, and genomics, Dr. Bashashati is tackling cancer treatment stratification.



Myeong Jin Ju, PhD
Assistant Professor

Through optical imaging and signal processing algorithms, Dr. Jin Ju is working on improved treatments and therapeutics in ophthalmology.



NEW BRAND

Since mid-2020 we've had the pleasure of collaborating with Will Creative on a new and standout visual identity for the School.

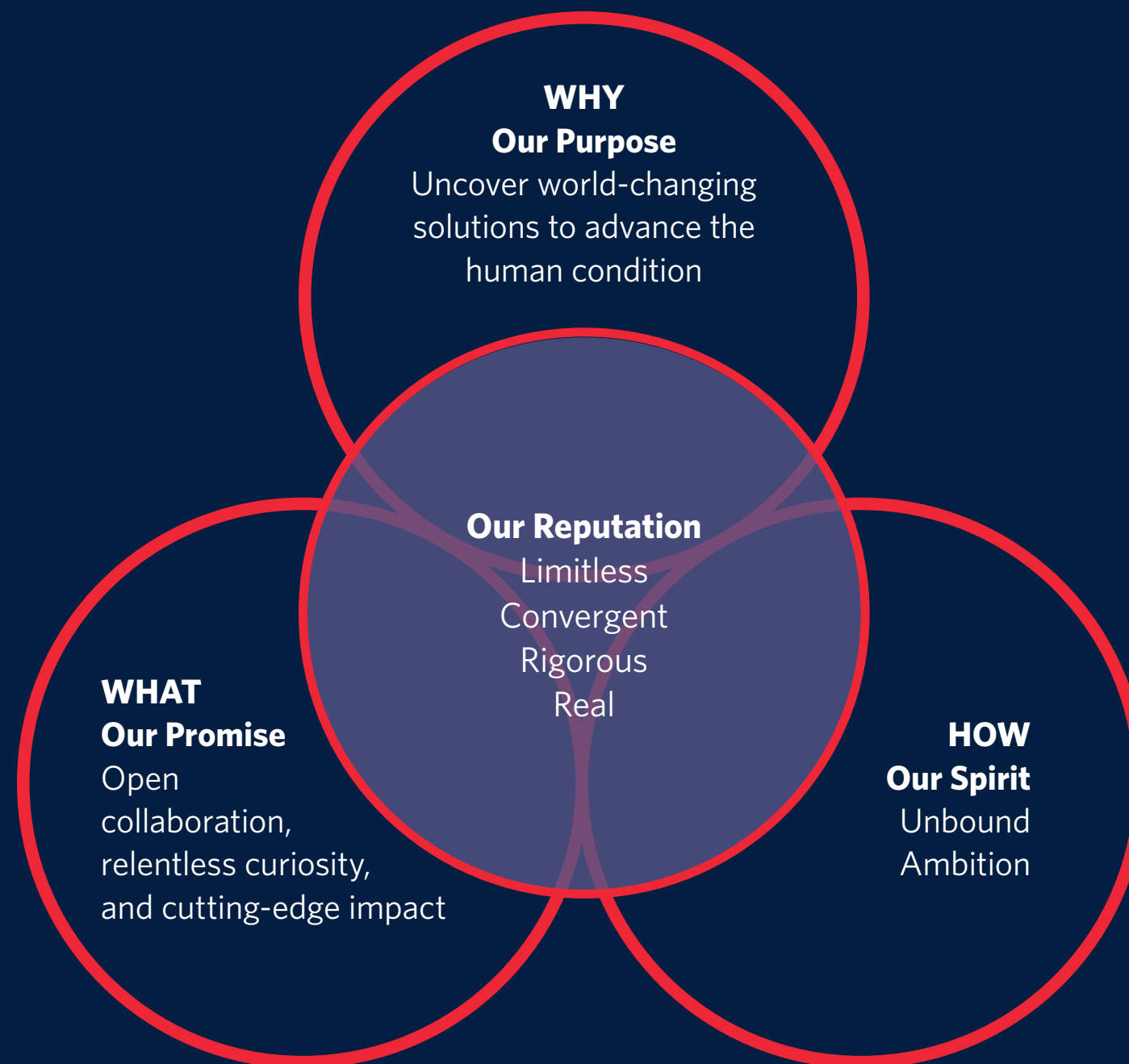
The strongest brands put people first, so we began the process by digging out the foundations of an already flourishing SBME culture to learn what the school, and being a part of it, really means to internal and external stakeholders. We conducted workshops with volunteers representing every part of the School from students and faculty to staff and leadership, and even our industry and hospital partners.

What we found was a community of rigorous problem solvers driven to harness their collective power to advance the human condition.

From there, Will synthesized all existing SBME messaging from stories and profiles to our strategic plan and began defining a brand that represented both the people, and the promise of the school.

One that captures the ever-evolving nature of Biomedical Engineering, the collaborative and solution-first mindset of our culture, and the intersection of technology and medicine that the field represents.

The result is what you see here. Bold colours, a symbol that flows and adapts, and a people-first brand that is home to the passionate, the curious, the creative and the inclusive.





NEW BRAND

The SBME icon (symbol) represents the convergence of biology and engineering, through the use of rounded, organic forms, and angular geometric shapes. These shapes form the main component of the identity – movement, change and adaptation – highlighting the many minds and disciplines working together to find new solutions to old problems through discovery and design.



Typography

We selected Trim for its bold, attention-grabbing attitude. Its cropped edges feel unconfined, and flow well with the UBC Whitney typeface.

Primary Typeface

Trim Bold

**ABCDEFGHI
JKLMNOPQR
STUVWXYZ**

Trim Medium

**Abcdefghi
jklmnopqr
stuvwxyz**

Secondary Typeface

Whitney Bold

**Abcdefghi
jklmnopqr
stuvwxyz**

Whitney Medium

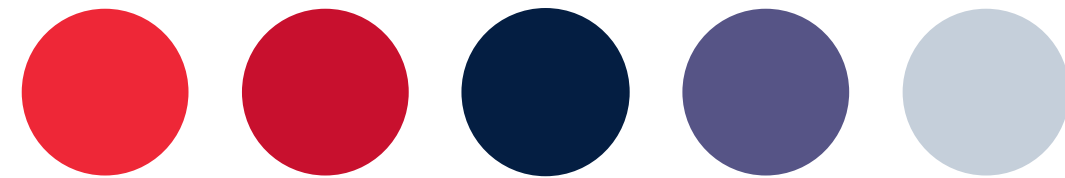
**Abcdefghi
jklmnopqr
stuvwxyz**

Whitney Book

**Abcdefghi
jklmnopqr
stuvwxyz**

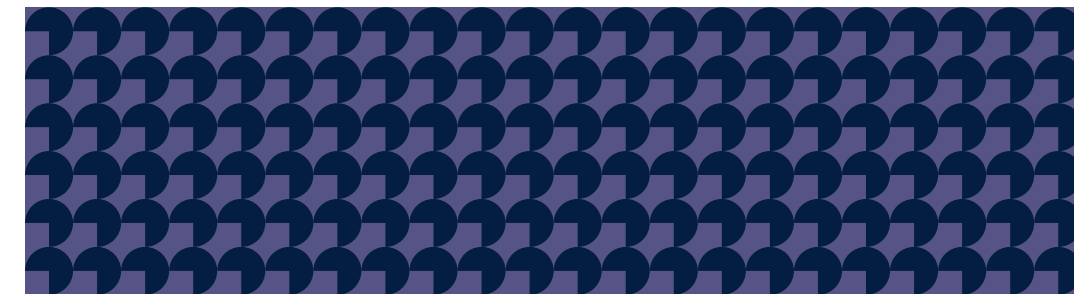
Colour

Our SBME Red captures the vibrancy and energy of the School and its goals. It contrasts and complements the UBC Blue and Applied Science Red while giving SBME a uniqueness within the UBC landscape.



Pattern

At the centre of our visual language is the SBME pattern, which uses shapes derived from our logo. It can take on many forms, from textural backgrounds to large, bold frames, and is used in animations as a dynamic, expressive element.





NEW BRAND





NEW BUILDING

Imagine a state-of-the-art facility that is agile, ever-evolving, and devoid of scientific or academic boundary. With the support of partners across UBC, the SBME is building Canada's hub for transformative Biomedical Engineering education and research.

Patkau Architects and **Architecture 49** have been amazing partners in the design of a building that will house SBME Faculty and Staff, students, industry and hospital partners, lecture halls, teaching laboratories and more. It's a building made for convergence and collision. That's where innovation happens. It's where new futures are made.

Welcome to Canada's Living Laboratory.





2020 SNAPSHOT

We got started in 2017. Here's where we are now.





PEOPLE

In four years, we have built an inclusive, growing community of driven and passionate people.

They are changing the future of health and healthcare.

412 STUDENTS

271 Undergraduate Students

141 Graduate Students

80 FACULTY

35 Core Research and Teaching Faculty

42 Associate Faculty

3 Affiliate Faculty

across 15 departments

32 STAFF

Core Faculty +

Administrative Staff



REACH

Our collaborations with industry and institutions, support for new Life Science ventures and governance committees have expanded our reach across Canada and beyond.

14

**MEMBER INDUSTRY
ADVISORY
COMMITTEE**

6

**MEMBER EXTERNAL
ADVISORY
COMMITTEE**

5

**CORE
FACILITIES**

3

**UNIVERSITIES
HOSPITALS
RESEARCH CLUSTERS**

2

**NEW VENTURES
SUPPORTED**



PARTNERSHIPS

The key to changing health and healthcare for everyone lies in a collective, coordinated and convergent effort. We've expanded collaborative paths and research partnerships with industry, government, academia, not-for-profits, research institutes, and beyond.

[Learn more about SBME Partnerships](#)

60

**CO-OP STUDENT
PLACEMENTS**
in 2020

30+

**INDUSTRY
PARTNERS**

93%

**CO-OP EMPLOYMENT
RATE**



SBME & 2020





COVID-19 RAPID RESPONSE

2020 definitely had its obstacles. In a year where SBME had planned in-person program expansion, the pandemic brought all work, research and instruction into the virtual space in the span of a single weekend. As one of the driving values of SBME is to pivot, not panic, instruction moved online, research activities ceased, and we all built makeshift workspaces in our homes.

Despite the cost to shutting down ongoing research, labs under the SBME umbrella shifted to meet the COVID-19 crisis. Our people proved that Biomedical Engineering is perfectly suited to the task of a global pandemic. Students came together to develop a **low-cost ventilator**, placing Top 10 in a global competition of over 1100 teams, researchers worked on **new treatment interventions**, and faculty collaborated with the SBQMI to develop **novel COVID-19 diagnostic tools**.

The way the SBME responded was all the more admirable because while this was going on, our people were hard at work on major school initiatives like accreditation, building a new brand and website, hiring new staff and faculty, working with the University and architectural firms on the planning and design of the new SBME building, and expanding both our programs and partnerships.

All from those home offices. Well done, everyone.





COMMUNITY

How do you build a community from behind a computer screen?

This was one of the school's biggest challenges of 2020 (and will continue to be in 2021 as well), so we launched engagement initiatives, story series, online events and more to bring the SBME closer while we were apart.

SEMINAR & LECTURE SERIES

Our first order of business was to establish seminar and speaker series that would bring the SBME community together on a regular basis. To showcase students, we launched our Thursday Seminars, featuring talks from trainees across our research labs. We hosted leaders in BME for special and distinguished lectures, and we held our first in a new series of talks surrounding Equity, Diversity and Inclusion in academia. We even launched a weekly program where Faculty present their work to the staff of SBME.



10

SBME Invited Talks

57

SBME Trainee and Faculty Seminars

3

SBME Special Lectures

9

SBME Faculty Staff Talks



SBME INTERFACES PODCAST

How about a podcast? One great way to reach out and build our community is to showcase the people who work with, support and advance biomedical engineering.

We launched SBME Interfaces in 2020 and we've since had wonderful guests including grad and undergrad students, the president of UBC, the Dean of Applied Science, and many more to come.

"It's not just becoming a professor or being a scientist; you can go into the business side of things because biotech is booming."

- Priye Iworima

"In order to impact the world or to transform the world, we need to start by transforming ourselves."

- Dr. James Olson

To watch, check out our YouTube Channel

To listen, find us on Apple Podcasts and Spotify

SBME VIRTUAL OPEN HOUSE

In December, we invited the public to a virtual open house in which we gave everyone a glimpse of the future of medicine.

Over 200 attendees got a peek behind the curtain of SBME with faculty panel discussions, an SBME overview presentation about where we are and where we're going, and a virtual walkthrough of our future home.

[Watch the full Open House here](#)



REDI

Respect Equity Diversity Inclusion. A hard lesson from 2020 was the desperate need for much more than reactionary rhetoric in the cause of real equity in academia and the world at large. The university, the school and the nation were forced to stare blatantly at the truths of institutional and systemic racism, and .

The real gift of Equity, Diversity and Inclusion is perspective. When those who lead represent only a subset of the population, the decisions they make inevitably leave people to the side, and by doing so, leave possibility, progress and prosperity on the table. As it is in science, so too in society: the more perspectives we bring to that table, the more complete, resilient and adaptable the systems we build will be.

To that end, we established an SBME REDI program and sat its inaugural committee of SBME Students, Faculty and Staff. Working with EDI initiatives across campus, the committee has launched a speaker series on equity and racism in academia, established an action plan for the next five years, began surveying our community, and expanded our speaker and podcast guest roster.

[Learn more about SBME REDI and stay up to date on our next steps and actions](#)





EDUCATION





EDUCATION

To transform the future, we need to change how we train those who will lead that future. In 2020, we expanded our education programming with 33 new undergraduate Biomedical Engineering courses across all four of our specialized streams. Our education program is unique, built around a spine of biology and engineering design principles that teach our students to solve problems across scales, from the molecular to the whole body.





ENGINEERS IN SCRUBS

Celebrating 10 years of Engineers in Scrubs (EiS). The EiS program puts biomedical engineers in the hospital and clinic, providing them with hands-on training as they interact with healthcare providers across the medical spectrum to solve medical challenges.

“Effective and successful solutions to clinical problems fundamentally involve a collaboration between clinicians and engineers.”

- Dr. Antony Hodgson, EiS Founder

“More and more we find that clinicians are approaching us with project ideas, and some are quite knowledgeable in the biodesign process.”

- Dr. Roger Tam, EiS Director

**Learn how EiS started,
and where it's going next**

PHD ROTATION PROGRAM

One of the few offerings of its kind in Canada, the SBME PhD Rotation Program is a unique opportunity for students to meet, work with, and gain experience from multiple researchers across disciplines in the Biomedical Engineering space. Collaborative and interdisciplinary research is integral to scientific advancement – exposure to an array of labs and lab cultures is deeply valuable in broadening both a student's view of their field as well as their skill set.

“When rotating through labs I discovered new research streams within BME that I didn't even know existed, especially for someone coming from a mechanical engineering background.”

- Matthew Hickey

**Read Matthew Hickey's experience
as the first participant in the program**



STUDENT INITIATIVES

Student groups like the BME Undergraduate Student Association (BMEUSA) and the BME Graduate Association organize academic, social, and professional development events to help students make the most out of their experience at SBME. Both groups showed outstanding initiative this year, spearheading SBME's first Networking event with over 100 attendees and industry representatives in the field, as well as the international CUBEC Conference that brought together Canada's undergraduate BME community for two days of talks, panels and networking.

"Many students feel lost trying to determine next steps. We wanted to provide a platform for them to explore the wide range of options available and gain insights on which direction would be best for them."

- Nadine Truter, Co-President, BMEUSA

[Learn about the event here](#)

TRAINING TOMORROW'S LEADERS

The SBME does more than teach students biology and engineering design principles. We are training them to lead a future in which health and healthcare are effective, innovative and accessible to all. Nothing is a better example of our students' dedication and drive than having two ranked in the top five of Canada's Vanier Scholarship competition.

[Read the full Vanier story here](#)

33

**New Undergraduate BME Courses
across all four Specialized Streams**

15

Awards and Scholarships won

\$1M+

in Scholarships and Awards



THE ROAD TO ACCREDITATION

After a great deal of work, information gathering, facility tour recording, meetings, team building and so very much more, the school is on the cusp of Accreditation. The process is overseen by the Canadian Engineering Accreditation Board (CEAB), and upon completion, will ensure that students who receive a degree from SBME will have met the academic requirements needed to become licensed with Canada's engineering regulators.

Accreditation means that we are meeting the high standards of licensure, and that our degrees will be accepted by nationwide regulators as well as their international partners. It means that our degree program is finally on the map, and that our goals to continually improve and expand the culture are making an impact.

This year-long process came to a close on March 2nd with a virtual site visit from the CAEB.

Our accreditation team of Dr. Peter Crompton, Dr. Jenna Usprech, Dr. Negar Harandi, Tegan Stusiak, Hema Ratnasami and Rashmi Prakash have put forward a frankly supernatural effort to get us here, and they did it all while working remotely and still maintaining their own professional, research and academic pursuits.

Deep and abiding thanks to you from the entire SBME community.





RESEARCH





RESEARCH

The SBME's research capacity expanded across all major research areas while also making an impact in the fight against COVID-19.

In areas like molecular and cellular engineering and synthetic biology, genomics and nano-devices, regenerative medicine, artificial intelligence and simulation systems with biomedical application, visualization and imaging the SBME grew.





PUBLICATIONS

217

8%

**IN TOP 1%
JOURNALS**

47%

**IN TOP 10%
JOURNALS**



FUNDING
\$36.2M

\$1M
**IN INDUSTRY
CONTRACTS**

\$1M
**IN CLINICAL
TRIALS**

\$2.2M
**IN SALARY
REWARDS**

\$32M
**IN OPERATING
GRANTS**



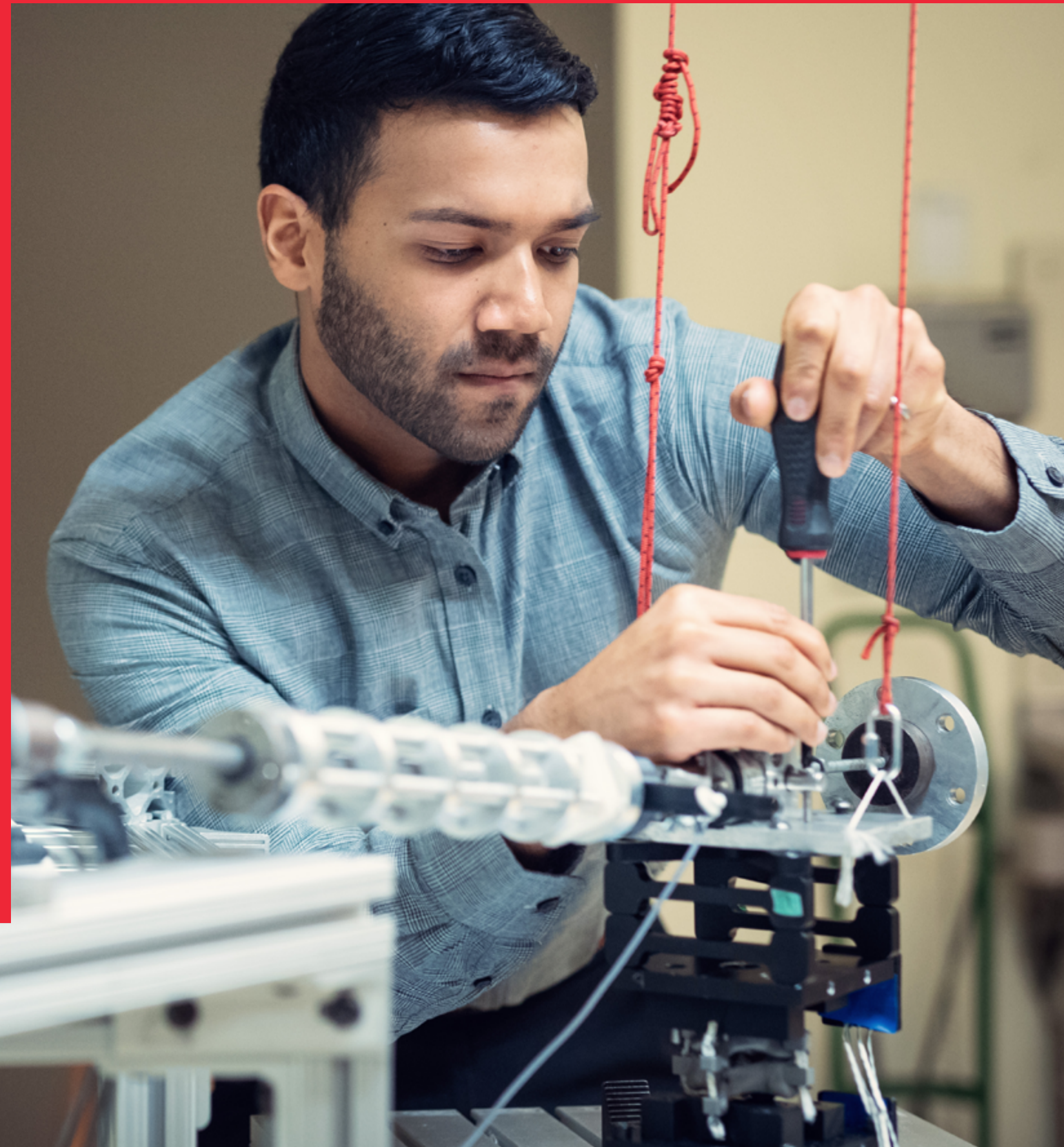
SBME INNOVATES

At SBME, we not only push research and education forward, we also enable viable translation and commercialization of biomedical innovations.

SBME Innovates is an incubation hub for early-stage life sciences ventures on their path to market viability.

In partnership with **e@UBC and HATCH, Starfish Medical, StemCell Technologies, Universal Cells, The Centre for Commercialization and Regenerative Medicine,** and **Aspect Biosystems,** and backed by **Western Economic Diversification** funding, we host ventures for 6-12 months, providing access to dedicated wet laboratory space, equipment, and building services, free of charge.

This residency also connects ventures with the SBME community while giving them access to SBME communications channels to help bring awareness to their work.





IN THE NEWS

Despite all of the obstacles, hurdles and the unpredictable path of 2020, not only did SBME research initiatives advance in ways we never could have expected, our researchers themselves still made headlines.





SBME A BLUEPRINT FOR THE FUTURE OF MEDICINE

In this Globe and Mail piece, the SBME is covered for its huge potential both as a school and as an ambassador for the field of Biomedical Engineering. The school is designed to transform medicine for all, and it was exciting to be recognized for it.

"I not only want to make key biological discoveries but to be able to push them into the commercialization pipeline and make a difference for Canadians."

- Dr. Nika Shakiba, Assistant Professor, SBME

[Read the full story](#)

DR. CAROLINA TROPINI FIRST CANADIAN TO RECEIVE JOHNSON & JOHNSON WOMEN IN STEM2D AWARD

Dr. Carolina Tropini Won the much-coveted Johnson & Johnson Women in STEM2D Award. She is the first Canadian recipient, and is using the recognition to further her outreach work and her exciting research on the gut microbiome.

"The gut microbiota is unique to each individual. It is also malleable, which makes this ecosystem an enticing target for personalized medicine."

- Dr. Carolina Tropini, Assistant Professor, SBME

[Read the full story](#)



DR. NOZOMU YACHIE NAMED CANADA RESEARCH CHAIR IN SYNTHETIC BIOLOGY

One of our newest Faculty Members was named a CRC in Synthetic Biology just as the year came to a close. We had the distinct pleasure of announcing it at our Virtual Open House.

"It will be an adventurous and incredible scientific and personal journey for myself and the team."

- Dr. Nozomu Yachie, Associate Professor, SBME

[Read the announcement](#)

PETER ZANDSTRA INDUCTED INTO THE CANADIAN ACADEMY OF HEALTH SCIENCES

In 2020, SBME's leader was recognized for his extraordinary work in the field of Biomedical Engineering with the well-deserved honour of being named a Fellow of the Canadian Academy of Health Sciences.

"BME is well-recognized for its impact in healthcare, and I think that as we broaden the definition of BME to include innovation and technological development at the molecular and cellular scale, this recognition will only increase."

- Dr. Peter Zandstra, Director, SBME

[Read more](#)

THANK YOU

BME.UBC.CA

