



# School of Engineering

Okanagan Campus

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ANNUAL REPORT 2019-20



Exterior of Innovation Precinct One at 1540 Innovation Drive.  
The 24,400 sq. ft. research facility will house School of Engineering  
research labs along with space for research collaborator Kal Tire.

# Welcome



## MESSAGE FROM THE DEAN

What an unprecedented year we have experienced over the course of the 2019-20 academic year. It has been another year of incredible growth and success for the School of Engineering. I have been equally, if not more, impressed with the perseverance, ingenuity and enthusiasm that our students, staff, and faculty have put on display during the many challenges we have faced related to COVID-19. It is in these times that we learn what we are truly capable of.

I am pleased to see that the School continues to expand its research programs and facilities. This expansion is providing our students with unique real-world and tangible experiential learning opportunities in existing and new programs, minors and options. The research is also leading to discoveries and innovations for our many government and industry partners.

This upcoming year will see the fifteenth anniversary of UBC Okanagan, and the ten year anniversary for the School of Engineering's first graduating class. There will be much to celebrate as we look towards a next year, but first join me in looking back at an exceptional year on the Okanagan campus.

**James Olson, PEng, PhD, FCAE**  
Dean, Faculty of Applied Science  
Professor of Mechanical Engineering



## MESSAGE FROM EXECUTIVE ASSOCIATE DEAN

As a driver for applied research and innovation, the School of Engineering (SOE) has developed research clusters that delineate core research categories. These research categories encompass researchers who share common expertise, and play an important role in building a collaborative environment. That collaborative environment is helping to establish a research hub that is uncovering innovation, and fostering an entrepreneurial spirit leading to impactful research and evolution in business.

I have been inspired by the efforts and determination of our students, staff, faculty, and partners as we have all adapted to the challenges of COVID-19. Your vital contributions epitomize the resourcefulness and focus of our profession.

When we look into the future, there are so many exciting opportunities on the horizon. As we head into a new academic year, SOE will continue to embrace these opportunities and innovate in collaboration with our partners, students and researchers.

**Rehan Sadiq, PEng, PhD, FCAE**  
Executive Associate Dean, School of Engineering  
UBC's Okanagan campus

# By the numbers

1499

Undergraduate  
students

339

Graduate  
students

64 faculty

28 staff

## OPERATING EXPENSES

\$13.69M

### TOTAL EXPENSES

Faculty Salaries  
\$7,981,691

Operating Expenses  
\$836,018

Other Salaries & Benefits  
\$4,384,218

Capital Expenses  
\$491,861

## UNDERGRADUATES BY YEAR

30%

First-year

25%

Second-year

23%

Third-year

22%

Fourth-year



## UNDERGRADUATES BY PROGRAM

28%

Civil

29%

Electrical

1%

Manufacturing

42%

Mechanical

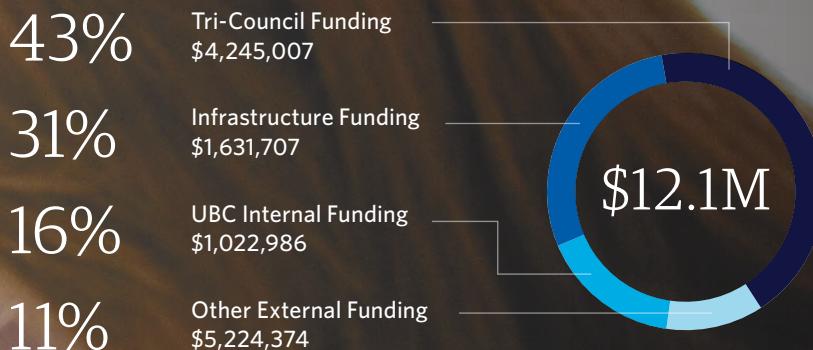


# Research

The School of Engineering plays a pivotal role in UBC's annual economic impact in the Okanagan region (approximately \$1.5-billion). In 2019, engineering researchers led 420 projects with local, national and international partners. In the past year, research funding has grown over \$5-million.

## Funding

### RESEARCH FUNDING 2019/20 Fiscal Year Projects



### FUNDING BY DISCIPLINE



\*Interdisciplinary research makes up the remainder of the funding allocation

### MITACS INTERNSHIPS

264 internship units      88% of total UBCO Accelerate Funding

# Research headlines



## HYDROGEN AFFECTS NATURAL GAS COMBUSTION

Improving the understanding of how hydrogen-enriched natural gas burns – **Sajjad Mohammadnejad** (Sina Kheirkhah)



## STUDENTS PUT COSMIC RAY RESEARCH ALOFT

Group of students launch a science experiment into the stratosphere with help from the Canadian Space Agency – **Giulia Rossi (Jonathan Holzman)**



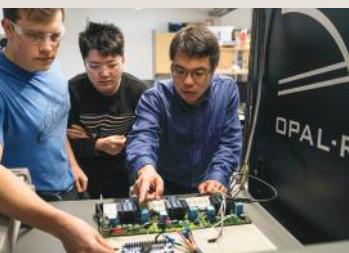
## NEW SENSOR DETERMINES REAL-TIME ICE ACCUMULATION

A new sensor, that can detect ice accumulation in real-time, might be a game-changer when it comes to airline safety and efficiency – **Mohammad Zarifi & Kevin Golovin**



## NEXT-GENERATION BATTERY DEVELOPMENT

Designing and developing a battery that is smaller and more powerful than what's currently available using Tellurium – **Jian Liu**



## \$1.5M TO DEVELOP HIGH-PERFORMANCE BODY ARMOUR

Research will combine new textile technologies and comfort testing to provide lighter, safer protective gear – **Kevin Golovin**

## MICROBES ARE DEGRADING INFRASTRUCTURE

Examining the impact of fungal mould growth and associated microbes within structures on university campuses – **Negin Kazemian** (Sepideh Pakpour & Abbas Milani)

## DETECTING WATER CONTAMINATION FASTER

New method uncovers a fast and highly-accurate process to detect and measure contaminants in water – **Nicolas Peleato**

## DISCARDED CONSTRUCTION MATERIALS GIVEN A SECOND LIFE

Adding stone slurry to polymers provides flexibility to a new particulate polymer matrix composite – **Davoud Karimi** (Abbas Milani)

## NEW 'HYPER GLUE' FORMULA

Discovered a broadly applicable method of bonding plastics and synthetic fibres at the molecular level in a procedure called cross-linking – **Kevin Golovin**

## IMPROVING SAFETY EQUIPMENT FOR PREGNANT WOMEN

Developed an innovative model to map the impact of trauma on a pregnant woman and her uterus if she were involved in an accident. Findings could lead to improved airbag technology – **Hadi Mohammadi**

## RETROFIT CLOTHING DONATION BINS HIT THE STREETS

School of Engineering task force have solved the problem that took several lives and cost Canadian charities thousands of dollars in lost income – **Ray Taheri**

## EXTREME WEATHER CONDITIONS TAXING URBAN DRAINAGE SYSTEMS

Designed methods for urban drainage systems to withstand possible catastrophic storms or even unpredictable failures during a moderate storm – **Saeed Mohammadiun** (Rehan Sadiq & Kasun Hewage)

## MEDICAL DIAGNOSIS THROUGH LEVITATING HUMAN BLOOD

By using a stream of electricity that separates protein from blood plasma, researchers predict opioid dependencies and addictions. The findings could one day lead to medical diagnoses – **Sepideh Pakpour**

## ELIMINATING BROWNOUTS AND BLACKOUTS

New research is redesigning how electricity is distributed within power grids through new configurations involving multiple microgrids – **Yuri Rodrigues** (Morad Abdelaziz & Liwei Wang)

## RESEARCH TO INNOVATION

In 2019, the School of Engineering produced 17 new intellectual property (IP) and invention disclosures. As a young campus with motivated and aspiring faculty researchers, the School of Engineering is truly an incubator for innovation and creativity.

### 2019/20 FISCAL YEAR PROJECTS



### PUBLICATIONS



\*Publications in Top 10% Journal Percentiles by CiteScore Percentile

### RESEARCH CLUSTERS

**ADVANCED MATERIALS & MANUFACTURING**

**HEALTH TECHNOLOGIES & BIOMEDICAL ENGINEERING**

**ADVANCED SYSTEMS & DATA ANALYTICS**

**URBAN INFRASTRUCTURE & GREEN CONSTRUCTION**

**CLEAN TECHNOLOGIES & ENVIRONMENTAL SYSTEMS**

## Notable Announcements

### CLUSTER OF RESEARCH EXCELLENCE IN COMFORT ENHANCED TECHNOLOGIES

Understanding, evaluating and enhancing comfort to improve human health and performance. Lead researcher – Kevin Golovin (Eminence Funding)

### CLEAN TECHNOLOGY COLLABORATION

Foresight Cleantech Accelerator Centre, Okanagan College and UBC Okanagan establish a new collaboration to create jobs and intellectual property, and grow the cleantech ecosystem in B.C. and Canada.

### OFFICIAL LAUNCH OF ENGINEERING DESIGN LAB

UBC opens new teaching and makerspace lab spaces providing over 5,000 sq. ft. accommodating a Fluid Mechanics and Hydraulics Lab, Makers Space, and a Matter and Energy Lab.



# Resource Recovery

Engineering Professor Cigdem Eskicioglu has been named the Senior Industrial Research Chair (IRC) in advanced resource recovery from wastewater. The IRC role, awarded in partnership with the Natural Sciences and Engineering Research Council of Canada (NSERC) and Metro Vancouver, will focus on developing the next generation wastewater sludge treatment technologies that recover energy and resources from what we pour down the drain.

"(This) will have a significant impact on adopting new technologies by municipalities across the country and will potentially create a strong ecosystem of innovation in waste-water treatment"

**Marc Fortin**, Natural Sciences and Engineering Research Council Vice-President

## EXPERIENTIAL LEARNING

Nearly 400 first-year engineering students unveiled their design projects as part of the 2019 APSC 171 Engineering Drawing and CAD/CAM course

In 2019/20, 58 engineering students participated in 88 four-month co-op work terms with 40 different organizations within BC's Southern Interior.

ENGR 499 Capstone included 264 students undertaking 52 projects with 49 industry partners.

# Campus recognition

Dr. Eskicioglu recognized as the 2020 UBC Okanagan Researcher of the Year (NSERC category). The Office of Research Services pointed to her internationally recognized research in environmental engineering for pollution prevention, bioenergy maximization and resource recovery from organic waste. Her work bridges multi-disciplinary and academic boundaries in the pursuit of making the world a cleaner and more sustainable place. Since 2008, she has made a significant contribution to research on the Okanagan campus of UBC, across Canada, and around the world.

## Inclusivity & diversity

The School of Engineering appoints two Equity Diversity and Inclusion Advisors

Drs. Jannik Eikenaar and Sabine Weyand will be responsible for directing and supporting activities aimed at making the School of Engineering a welcoming and inclusive place for all. The EDI Advisors will oversee four key pillars, including workplace environment, physical space, curriculum, and student experience, and assist in coordinating outreach activities.

17%

Undergraduate  
students are female

31% ↑

Registered female  
students\*

34% ↑

Registered Indigenous  
students\*

\* Since 2016

## **Student & alumni success**

School of Engineering has 1828 alumni since the first graduating class in 2009. Our outstanding alumni have become a major force throughout industry and academia in Canada and around the world. The lessons they learned at UBC and the networks they developed are the foundation of their success.

### **2019 CONVOCATION NUMBERS**

**12 PhD**

**43 MSc**

**21 MEng**

**220 BASc**

## **Awards & recognition**

**Shola Fashanu, Kaila Spencer, Mitchell Asling & Holly Denby**  
First place at the Western Engineering Competition in Saskatoon.

**Levi Bieber**  
2020 Alexander Graham Bell Canada Graduate Scholarships  
recipient

**Mohammad Tiznobaik**  
The American Concrete Institute (ACI) Wason Medal for  
Materials Research Award

**Ilija Hristovski**  
2020 Killam Doctoral Scholarships & 2020 Alexander Graham  
Bell Canada Graduate Scholarships recipient

**2020 UBC Okanagan Concrete Toboggan Team**  
**1st place in the technical report category**

**Professor Jonathan Holzman recognized as an Engineers Canada**  
**Fellow honouring his noteworthy service to the engineering**  
**profession.**

## Staff Excellence

The School of Engineering's Graduate Studies Administrative Assistant, Shannon Hohl, was recognized with the 2019 University of British Columbia Okanagan's Staff Award of Excellence recipient in the Enhancing the UBC Experience category.

### FACULTY

Rudolf Seethaler named MEng Coordinator



### STAFF

New additions to the School of Engineering include: Brittany Parr (Administrative Assistant), Kayla Soriano (Undergraduate Programs Assistant), Patti Ostrikoff (Curriculum, Accreditation & Transfer Student Coordinator), and Tamara Weninger (Engineering Outreach and Advisor)

The School of Engineering gave me the opportunity to grow my communication skills and learn what's required to work as a member of a team to accomplish a common goal.

**Julia Halipchuk (BASc, Civil '13) is a Building Science & Restoration Engineer with Read Jones Christoffersen Ltd.**



The SOE is a special place that brings faculty from different disciplines close together and provides the opportunity for students to be exposed to a multidisciplinary research environment.

**Hossein Montazerian (MSc '18, Mechanical) is a PhD Graduate Student Researcher, Center for Minimally Invasive Therapeutics, Bioengineering Department, University of California-Los Angeles**



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Faculty of Applied Science  
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