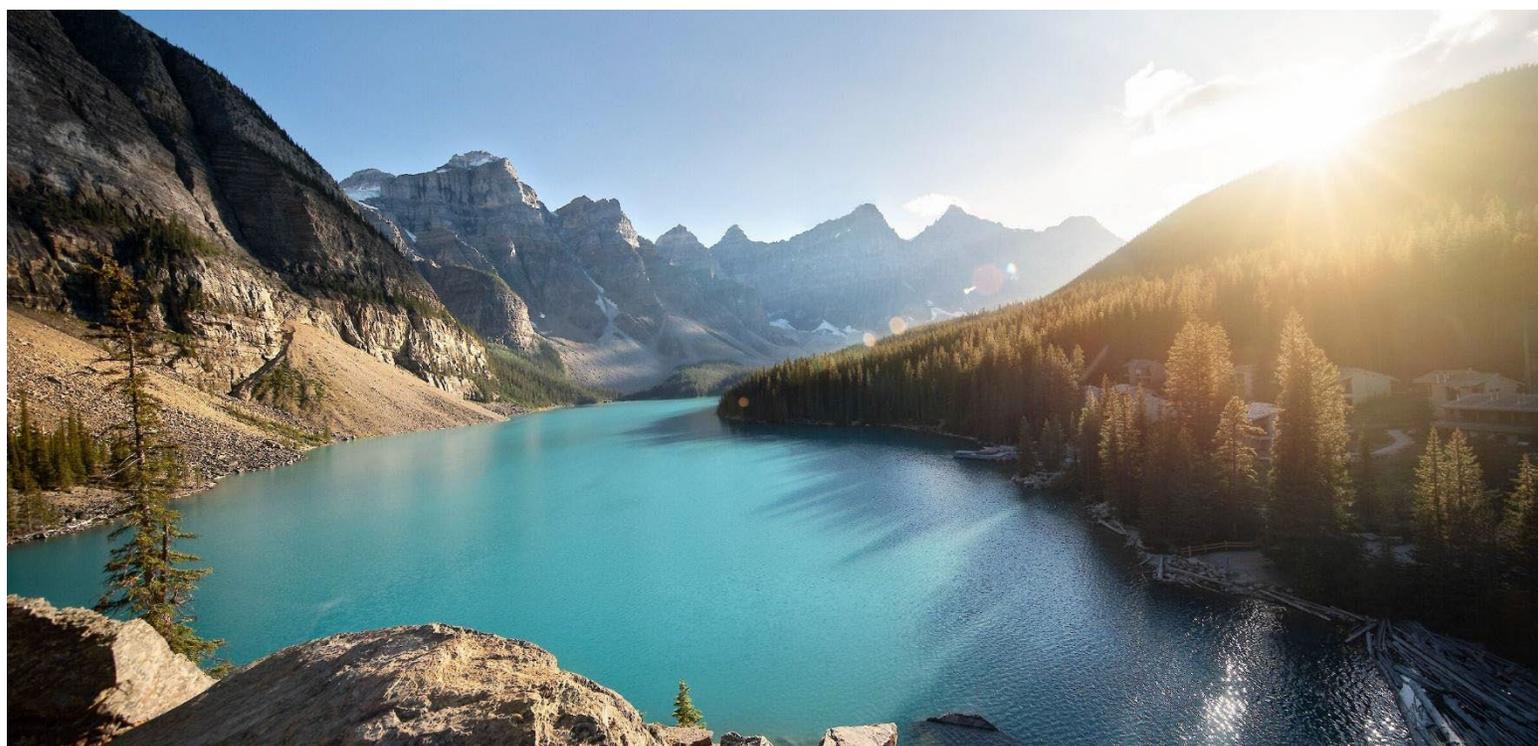


25<sup>th</sup> Annual  
**Alberta Biomedical Engineering Conference**  
Program and Proceedings



October 25-27, 2024



**October 25-27, 2024**

## **PROGRAM COMMITTEE**

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Dan Romanyk

University of Calgary

Michael Kallos  
Roman Krawetz

University of Saskatchewan

Emily McWalter

#### **Student Co-Chairs**

University of Alberta

Lingyu Bu  
Mahzad Sadati

University of Calgary

Nina Pavlovic  
Tudor Muresan

University of Saskatchewan

Samira Khoz  
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JD Johnston  
Angie Lang  
Steve Machtaler  
Emily McWalter

#### **University of Lethbridge**

Jon Doan

## KEYNOTE SPEAKERS

<b>Janet Ronsky</b>	<b>Professor Emeritus, University of Calgary</b> Organizer, Inaugural AB BME Conference
<b>Nigel Shrive</b>	<b>Professor Emeritus, University of Calgary</b> Organizer, Inaugural AB BME Conference
<b>Alan Wilman</b>	<b>Professor, University of Alberta</b> Organizer, Inaugural AB BME Conference

## INDUSTRY SPEAKERS

<b>Sabina Bruehlmann</b>	<b>CEO, Nimble Science</b>
<b>Christian Clermont</b>	<b>Senior Research Scientist, Canadian Sport Institute Alberta</b>
<b>Abhilash Hareendranathan</b>	<b>Former R&amp;D Lead, MEDO.ai Inc.</b>
<b>Emily Matijevich</b>	<b>Director of Biometrics and Applied Research, Orpyx Medical Technologies</b>

## STUDENT TRAINEES

<b>University of Alberta</b>	Lingyu Bu Mahzad Sadati	
<b>University of Calgary</b>	Nina Pavlovic Tudor Muresan	Conference Student Co-Chairs
<b>University of Saskatchewan</b>	Samira Khoz Kayla Walker Mohammadreza Behboodi Lingyu Bu Jessica Corpuz Mohammad El-mougey Leah Fisher Donald Golden Hannah Laing Mariia Mielkozorova Dora Modrein Tudor Muresan Mahzad Sadati Justen Saini Alana Stahl Nina Pavlovic Kayla Walker Kara Walz	Session Chairs

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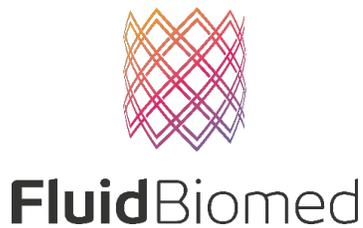
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# PROGRAM

FRIDAY		
3:00 – 3:10 pm		<b>Welcoming Remarks</b>
<b>Podium Presentations: Session 1</b>		
3:10 – 4:05 pm		Session Chairs: Mohammedreza Behboodi, Tudor Muresan
Stephens, Emma		Antimicrobial and Antithrombotic Properties of Gallic Acid-Loaded Bacterial Nanocellulose Membranes
Gysel, Emilie		Direct differentiation of human induced pluripotent stem cell aggregates into mesenchymal stromal cells
Pavlovic, Nina		Using quantitative computed tomography to analyze 3-year volumetric bone mineral density changes following anterior cruciate ligament injury
Tughra, Benafsha		Advanced Imaging Techniques for Quantifying Collagen Content in Articular Cartilage
Roeske, Jamie		Developmental mismatches between amygdala and PFC macrostructure and white matter tract microstructure across childhood and adolescence
4:05 – 4:25 pm		<b>Coffee Break</b>
<b>Podium Presentations: Session 2</b>		
4:25 – 5:31 pm		Session Chairs: Mahzad Sadati, Mariia Mielkozorova
Johal, Kabir		Utilizing Weight-Bearing Computed Tomography to Analyze Scapholunate and Carpal Joint Articulation
Walker, Kayla		Flexible Ultra Short Echo Time (FUSE) MRI of the Patellar Tendon
Mahajna, Muhammad		Novel Uterine Contraction Monitoring Using a Remote Wireless Device
Nolan-Fisher, Brendan		Improvement of a Serum-Free Media for Bioreactor Expansion of Equine Bone Marrow Derived Mesenchymal Stromal Cells
Ardebili, Aria		Investigating the link between antiepileptic drugs and bone remodeling
Selimos, Demitra		The Effect of Metformin on Disease Progression and Cerebral Perfusion in an Experimental Model of Multiple Sclerosis

<b>5:31 – 5:41 pm</b>		<b>Break</b>
<b>Keynote Speaker</b>		
<b>5:41 – 6:30 pm</b>		Chairs: Lingyu Bu, Mahzad Sadati
		<b>Dr. Janet Ronsky</b> <b>Dr. Nigel Shrive</b> <b>Dr. Alan Wilman</b>
<b>6:30 – 7:30 pm</b>		Reception
<b>7:30 – 9:00 pm</b>		Industry-Faculty Mixer
<b>7:30 – 9:00 pm</b>		Student Trivia Night
<b>SATURDAY</b>		
<b>7:00 – 8:00 am</b>		<b>Breakfast</b>
<b>Podium Presentations: Session 3</b>		
<b>8:00 – 8:44 am</b>		Session Chairs: Jessica Corpuz, Leah Fisher
	Rusteika, Maggie	Investigating the role of HES1 in regulating in vitro developmental clock models derived from induced pluripotent stem cells of multiple mammalian species
	Kakadiya, Dhruvi	Implementation of an Enhanced Paper Dipstick Design for Scalable Rapid Nucleic Acid Extraction at the Point of Need
	Boyer, Alexa	NeuroRecoVR: Split-Belt Virtual Reality Treadmill Training for Subacute Stroke
	Saini, Justen	Surgical Treatment of Distal Biceps Tendon Ruptures Provides Superior Strength and Endurance
	Lo, Alana	Biomarkers of Bone Turnover in Peri- and Early Menopausal Women
<b>8:55 – 9:15 am</b>		<b>Coffee Break</b>
<b>9:15 – 10:45 am</b>		<b>Poster Session 1</b>

<b>Podium Presentations: Session 4</b>		
<b>10:45 – 11:29 am</b>		Session Chairs: Mohammad El-mougey, Justen Saini
	Wilde, Kurt	Optimization of the Density-Elasticity Relationship for Rabbit Hindlimb Bones
	Harding, Jackson	Development of a Point-of-Care Method to Improve Microbiome Care in Premature Infants
	Palset, Abbey	Assessing neuroinflammation by developing standardized methods of immunohistochemistry and microglia and macrophage quantification in the rodent brain
	Hassan, Mostafa	Transfer learning with deep convolutional network for the Identification of adolescent idiopathic scoliosis maximum Cobb angle using 3D torso surface topography
	Koshyk, Andrew	Using Weibull Analyses to Characterize Fatigue Failure Probability in Cortical Bone
<b>11:45 am – 1:00 pm</b>		<b>Lunch Break</b>
<b>Podium Presentations: Session 5</b>		
<b>1:00 – 1:55 pm</b>		Session Chairs: Dora Modrcin, Alana Stahl
	Shao, Yuchen	Diabetic neuropathy detection using biosensing platform for glucose, lactate, ion, pH and temperature sensing with microfluidic system for collection of human sweat
	Boyd, Max	Determining the Effects of Antiepileptic Drugs on Mesenchymal Stem Cell Viability and Differentiation Ability
	Walz, Kara	Calf Muscle Volume and Fat Fraction Changes Following Bedrest
	Kazemi, Niloofar	Effect of indoxyl sulfate on albumin adsorbed amounts and layer rigidity
	Zakershobeiri, Matin	Transmit Field Map Prediction in MRI Using Machine Learning
<b>1:55 – 2:00 pm</b>		<b>Break</b>
<b>2:00 – 2:20 pm</b>		<b>Sponsor Presentations: Garmin, Alberta Innovates</b>

<b>Industry Panel</b>		
<b>2:20 – 3:45 pm</b>		Chair: Nina Pavlovic, Kayla Walker
		<p><b>Sabina Bruehlmann</b> CEO, Nimble Science</p> <p><b>Christian Clermont</b> Senior Research Scientist, Canadian Sport Institute Alberta</p> <p><b>Abhilash Hareendranathan</b> Former R&amp;D Lead, MEDO.ai Inc.</p> <p><b>Emily Matijevich</b> Director of Biometrics and Applied Research, Orpyx Medical Technologies</p>
<b>3:45 – 3:50 pm</b>		<b>Break</b>
<b>Podium Presentations: Session 6</b>		
<b>3:50 – 4:45 pm</b>		Session Chairs: Lingyu Bu, Hannah Laing
Schafer, Aidan		Effect of Mesenchymal Stem Cell Conditioned Media on Fibroblasts: Implications for Skin Regeneration and Wound Healing
Ahmadi, Hanieh		Cohort study on mild cognitive impairment and Alzheimer's disease in the hippocampus using MRI T2 Mapping
MacIntosh, Delaney		Comparative Biomechanical Performance of Simple Wedge and Biplane Bone Grafts in Reverse Total Shoulder Arthroplasty
Eng, Jasper L.		Optimizing Limb Position Selection for Efficient Myoelectric Control Training
O'Sullivan, Carly L.		Effects of anesthesia on immunohistochemical analysis of cFos
<b>4:45 – 5:05 pm</b>		<b>Coffee Break</b>
<b>5:05 – 6:35 pm</b>		<b>Poster Session 2</b>

<b>Podium Presentations: Session 7</b>		
<b>6:35 – 7:30 pm</b>		Session Chairs: Donald Golden, Kara Walz
	Jalali, Kiarash	Accurate Water Content Measurement In Human Brain with MRI
	Woyessa, Naomi	Z-band Widening Preventing Titin Over-Extension During Muscle Stretching
	Afkhami Ardekani, Amirhossein	Enhancing Player Engagement via Dynamic Selection of Game Difficulty Using a Fuzzy-Based System
	Tiessen, Chris	After 70 years, can we finally explain residual force
	Ronaar, Qureshi	Exploring the Impact of Social Determinants of Health on Patient Outcomes in Intensive Care: A Combined Analysis of MIMIC-III and MIMIC-SDH Data
<b>7:30 pm</b>		<b>Closing Remarks + Group Photo</b>
<b>7:35 – 8:45 pm</b>		<b>Dinner</b>
<b>9:00 pm</b>		<b>Off-Site Social Event</b> <a href="#">Elk &amp; Oarsman</a> , Banff
<b>SUNDAY</b>		
<b>7:00 – 9:00 am</b>		<b>Breakfast</b>
<b>Sunday Workshop: MentorMatch Panel</b>		
<b>10:00 – 11:00 am</b>		Session Chairs: Nina Pavlovic, Tudor Muresan
		Sabina Bruehlmann Chelsea Gillett Anita Ludwar Emily Matijevich
<b>11:00 am – 12:00 pm</b>		<b>Sunday Workshop: MentorMatch Speed Dating</b>

## KEYNOTE SPEAKERS



### **Janet Ronsky**

Janet Ronsky, (PhD, P.Eng., FCAE) Professor Emeritus (University of Calgary), has affiliations with the Departments of Mechanical and Manufacturing Engineering (SSE), Biomedical Engineering (SSE), and Surgery (CSM), as well as the McCaig Institute for Bone and Joint Health and the Human Performance Lab (Kinesiology). Her research focuses on musculoskeletal biomechanics for understanding joint health and injury across the lifespan. Her research group advanced novel insights into in-vivo joint injury and disease diagnosis and treatments using high-speed biplanar videoradiography, medical imaging and numerical modeling approaches.

Involved in numerous local, provincial, and national BME initiatives, she was also a member of the original AB BME program team and lead the establishment of the UC Centre for Bioengineering Research and Education with the Undergraduate specialization in Biomedical Engineering. Janet is extremely proud of the accomplishments of the many undergraduate and graduate students as well as Post Doctoral Associates that she has had the privilege of working with throughout her career.



### **Nigel Shrive**

Soon after arriving in Calgary, Nigel Shrive started working with Cy Frank, an orthopaedic resident. After completing his fellowships, Cy returned to Calgary and their collaboration continued. This was the birth of Biomedical Engineering at the University of Calgary. As collaboration across the faculties grew along with the Human Performance Lab, so did the desire for a formal Graduate program. This was eventually achieved in 1996 with Nigel as the first coordinator of the program. Since then, BME has grown to its current state as an independent department with the graduate program involving some 300 academic staff in six faculties across the University.

In his career, Nigel has been elected as Fellow of the Canadian Academy of Engineering, Fellow of the Royal Society of Canada and more recently appointed as an Officer of the Order of Canada.



### **Alan Wilman**

Dr Alan Wilman is a Professor in the Department of Biomedical Engineering (BME) and in the Department of Radiology and Diagnostic Imaging at the University of Alberta. He was involved in the Alberta BME Conference from inception and attended the conference for many years as a co-organizer. He was the graduate program director for the Department of Biomedical Engineering for over 20 years.

His student-focused research program is on advancing MRI of the human brain by exploiting MRI physics, image processing and MRI acquisition techniques with funding from CIHR, NSERC and MITACS. A major application has been to multiple sclerosis and unveiling its iron signatures.

## INDUSTRY PANELISTS



**Sabina Bruehlmann**  
CEO, Nimble Science

Dr. Sabina Bruehlmann is the CEO of Nimble Science, a health technology company leveraging novel GI sampling technology to advance whole body health, from better diagnostics, new therapeutic applications and advanced diagnostics. Nimble's SIMBA GI intelligence platform is the first capsule-based tool for multi-omic mapping of the GI track to provide stakeholders across the life science continuum with endoscopy quality data from the home. Before this, she co-founded Zephyr Sleep Technologies, focusing on innovative diagnostic technologies where she led the R&D team.

Sabina holds a BSc in Mechanical Engineering from Queen's and a PhD in Biomedical Engineering from UCalgary with 20 years of on-the-job learning in early-stage medical technology commercialization.



**Christian Clermont**  
Senior Research Scientist, Canadian Sport Institute Alberta

Dr. Christian Clermont is a Senior Research Scientist with Sport Product Testing at the Canadian Sport Institute Alberta. He specializes in biomechanics and physiology research, focusing on sport-related health outcomes, performance, and injury prevention. With a Ph.D. in Kinesiology from the University of Calgary, Dr. Clermont has led research projects for major industry clients such as HOKA, adidas, Under Armour, lululemon, and Polar. His expertise encompasses human movement analysis, wearable technology, and advanced data analytics.

In addition to his research role, Dr. Clermont is an Adjunct Assistant Professor at the University of Calgary, where he mentors students and teaches kinesiology courses. He has published extensively, presented at numerous conferences, and consults on product innovation and development.

## INDUSTRY PANELISTS



### **Abhilash Hareendranathan** Former R&D Lead, MEDO.ai Inc.

As an Assistant Professor in the Department of Radiology at the University of Alberta, Dr. Hareendranathan's research focuses on artificial intelligence (AI), medical image analysis, and ultrasound imaging. His international experience includes collaborating with diverse research teams in Singapore, Germany, and Canada. During his Ph.D. at Nanyang Technological University (NTU) in Singapore, he developed machine learning techniques for image-guided non-invasive surgery. Following this, he worked with the ultrasound team at Panasonic R&D Center in Singapore, improving ultrasound beamforming, and later as an image segmentation specialist at Curefab in Germany.

As the R&D lead at MEDO.ai Inc., an AI start-up, Dr. Hareendranathan guided the development of AI solutions for medical ultrasound. His work focuses on creating AI approaches for automatic biomarker discovery, improving the speed and reliability of ultrasound assessments, and optimizing clinical workflows to enable lightly trained users to perform effectively.



### **Emily Matijevich** Director of Biometrics and Applied Research, Orpyx Medical Technologies

Dr. Emily Matijevich is currently the Director of Biometrics and Applied Research at Orpyx Medical Technologies, a digital health company dedicated to extending lifespan for individuals living with diabetes. She is passionate about creating data-driven tools and knowledge that promote human movement. Her research experience is in wearable sensor algorithm development, assistive technologies, and footwear biomechanics.

Emily completed a BS in Bioengineering at University of Illinois Urbana-Champaign, a PhD in Mechanical Engineering at Vanderbilt University, and a post-doctoral fellowship in the Faculty of Kinesiology at University of Calgary. In her free time, Emily enjoys teaching yoga, adventuring in the mountains, or helping at her partner's farm.

<b>Poster Session 1</b>		
<b>9:15 – 10:45 am</b>		
Spiian, Artem	1	Genetic Contributions to Cerebellum Aging: A Machine Learning Analysis of UK Biobank Data
Lunt, Graham	3	Effects of Surfactant Protein B on Polyethylenimine Mediated siRNA Gene Delivery Studied by Coarse-grained Molecular Dynamics
Marcelo, Hunter	7	Novel Characterization of Lubricant-Infused Biointerfaces Using Atomic Force Microscopy
Hanley, Judd	9	Using Scaling Factor and neuroCombat to Harmonize Multi-site Cerebral Blood Flow Maps from CT perfusion
Noim, Jurjaan	11	Methylene Blue as a Signal Tracer in Lateral Flow Assay
Fisher, Leah	13	Characterization of Additively Manufactured Zirconia for Dental Applications
Bu, Lingyu	15	Development and Validation of a Finite Element Model for Orthodontic Aligners
Azhdar, Mahtab	17	Exploring The Impacts of Taxane-Based Chemotherapy on Physical Function of Breast Cancer patients using Markerless Motion Capture System
Srabanti, Monisha	19	Four Dimensional Flow MRI-Derived Left Ventricular Flow Components as Novel Markers for Identifying Left-Sided Dysfunction in Mitral Regurgitation Patients with Preserved Ejection Fraction: Insights into Cardioembolic Stroke Prevention
Jaberimiandoab, Mahan	21	Passive dynamic walking with arms and torso: oscillation pattern and sagittal stability
Poormir, Mohammad Amin	23	Validation of an optimized E-BMD equation for QCT-FE modeling of the proximal tibia and comparison with published E-BMD equations
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Gulamhusein, Adam	27	Developing a Biofluid Electrical Conductivity Sensor as a Key Step Towards Early Cancer Detection
Mann, Darren	29	Potential neuromodulation of ascending spinal circuits through the use of epidural spinal cord stimulation after experienced a motor complete spinal cord injury: A case study
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Scott, Cameron	33	Preclinical Biomechanical Evaluation of Polypropylene and Nitinol Patches for Inguinal and Abdominal Hernia Repairs Using Rat Models
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# *Biomedical Engineering at the University of Alberta*

*Biomedical engineering is at the forefront of one of the most rewarding areas of engineering, applying the principles and methods of engineering to medicine by engaging in research and teaching. The advances we make today will be seen in medicine tomorrow.*

## DIVERSE AREAS RESEARCH

Research in biomedical engineering at the University of Alberta is exceptionally diverse, spanning four engineering departments and driving collaboration with many other faculties and institutions. A variety of research topics are explored at the university including:

- **Nanotechnology:** Leveraging advances in nanotechnology to develop new methods for drug delivery, wound healing, and nano-scale diagnostic devices.
- **Medical imaging:** Developing physical concepts and algorithms to improve ultrasound, MRI, CT, and optical modes of imaging to advance diagnostics and rehabilitation medicine.
- **Biomechanics And Rehabilitation Engineering:** Applying principles of basic science and engineering design to find solutions to problems in human movement, sport, and daily life—think about prosthetics, orthotics, and assistive devices.
- **Tissue Mechanics:** Material testing and computer modelling provide new insight into bone and soft tissue mechanics (e.g. bone fracture), and medical device design.
- **Microelectrical mechanical systems:** Exciting research in device design ranging from wearable monitors and compliant sensors to lab-on-a-chip microdevices.
- **Cryobiology:** The study of cold-adaptation, preservation of organs under hypothermic conditions for transplantation, lyophilization (freeze-drying) of pharmaceuticals, and cryosurgery.

# AN INSTITUTIONAL SUPPORT NETWORK FOR BIOMEDICAL ENGINEERING

Manufacturing, prototyping facilities and laboratories in Engineering at Alberta support biomedical engineering researchers and our collaborators. Key facilities include:

- The [NanoFAB](#) at the Nanotechnology Research Center which houses nano-scale x-ray and microscopy facilities
- Dedicated machine and fabrication services
- Access to campus-wide maker spaces such as the [Elko Engineering Garage](#), the Digital Scholarship Centre, and [The Shack](#)

## A GLOBAL INTERDISCIPLINARY EFFORT

Our biomedical engineering faculty and students share space and ideas with other researchers from world-renowned institutions such as:

- The Glenrose Rehabilitation Hospital
- The Royal Alexandra Hospital
- The National Research Council Nanotechnology Research Centre

## OPPORTUNITIES FOR STUDENTS

There are five engineering departments at the University of Alberta with 4800 undergraduate students and 1700 graduate students, many of whom study biomedical engineering problems. Our departments are:

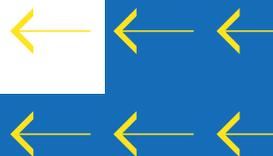
- Mechanical Engineering
- Chemical and Materials Engineering
- Electrical and Computer Engineering
- Civil Engineering
- Biomedical Engineering (graduate programs only)

Undergraduate students can earn a degree in Mechanical Engineering with the Biomedical Engineering Option, which includes co-op and clinical terms in addition to specialized courses.

**LEARN MORE** 

Graduate students can pursue doctoral (PhD) and master's (MSc) degrees in any of our engineering departments. Some departments have additional specialized programming available, such as a combined MEng/MBA program hosted by Chemical and Material Engineering.

**LEARN MORE** 



Alberta Innovates is a crown corporation reporting to the Ministry of Technology and Innovation.

As the provincial innovation engine, Alberta Innovates strives to support research and innovation by moving technology from conception to commercial reality. This is done by offering a suite of programs, including funding opportunities, trainee initiatives, and strategic programming designed to remove system barriers to innovation.

Our Health portfolio programs collectively position Alberta as a premier destination for clinical research, digital health, and emerging technologies by removing barriers and advocating for the innovation community.



## Health Innovation

The Health Innovation team is on a mission to strengthen economic competitiveness and enhance the well-being of people living in Alberta by cultivating a health innovation ecosystem that excels at converting research and technology into sustainable human-centered care.

### Four Pillars / Portfolios



**Research**



**Commercialization**



**Health System  
Transformation**



**Talent**

**For general program inquiries:** [health.admin@albertainnovates.ca](mailto:health.admin@albertainnovates.ca)

## Health Platforms

### About Health Platforms

The Health Platforms team within Alberta Innovates helps academics, clinicians, and companies navigate system challenges in Alberta's health research ecosystem.

Our programs position Alberta as a premier destination for clinical research, digital health, and emerging technologies by removing barriers and advocating for the innovation community.

**For general program inquiries:**  
[health.platforms@albertainnovates.ca](mailto:health.platforms@albertainnovates.ca)

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CLINICAL RESEARCH CONSORTIUM  
MANAGED BY ALBERTA INNOVATES

 **Clinical Trials  
Alberta**

 **edge**

 **arecci**  
A Project Ethics Community  
Consensus Initiative

 **AbSPORRU**  
Alberta SPOR SUPPORT Unit

### Programs with a Student Focus

 IDEATEALBERTA

A central hub for connecting and powering citizens, businesses, innovators, and communities with their voices in products.

Use IDEATE to:

- Promote your product
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- Seek Investment & Engage the broader community.

**Contact:**

[ideate@albertainnovates.ca](mailto:ideate@albertainnovates.ca)  
<https://ideatealberta.ca>

 **ALBERTA**  
CLINICAL RESEARCH CONSORTIUM  
MANAGED BY ALBERTA INNOVATES

The Alberta Clinical Research Consortium promotes quality, integrated, and efficient clinical health research provincially.

Access newsletters, resources, events, training, and foster connections within the clinical research ecosystem.

**Contact:**

[ACRC@albertainnovates.ca](mailto:ACRC@albertainnovates.ca)  
<https://acrc.albertainnovates.ca>

**Visit <https://albertainnovates.ca/> to learn more and begin your innovation journey!**



**Start  
something.**

# UCalgary Biomedical Engineering

Ready to make a difference

Located in the engineering capital of Canada, the University of Calgary's new Biomedical Engineering Department is advancing knowledge and solving problems in animal and human biology, medicine and health-care by educating the next generation of leaders. We are building on 25 years of transdisciplinary research and training excellence with new programming.

**Ready to contribute with multi-disciplinary training and scholarship, including:**

- Engineering knowledge in traditional fields such as mechanics; signals, systems and instrumentation; process engineering and transport phenomena.
- Biomedical engineering and life sciences knowledge in areas like anatomy and physiology, medical device design and regulatory affairs.
- Hands-on bench skills in both engineering and wet labs. Practical experience with programming and data analytics.
- Teamwork, collaborative and multidisciplinary problem solving in multiple design courses. Professional and technical communication skills.

Students are available for 12–16-month internships starting May 1 and assistance is available from the Schulich School of Engineering in placing job ads and scheduling interviews.

[Click here to learn more.](#)

Collaborative, skilled and experienced – University of Calgary's biomedical engineers are ready to help your team make a difference today.

[bme@ucalgary.ca](mailto:bme@ucalgary.ca)

[ucalgary.ca/bme](http://ucalgary.ca/bme)



[internship](#)



UNIVERSITY OF  
CALGARY





# Engineering Solutions for Health: Biomedical Engineering

Transdisciplinary, Collaborative, Translational Research

The Department of Biomedical Engineering provides an anchor for researchers across campus targeting health problems with the highest burden in terms of decreased quality of life, financial cost, mortality and morbidity — particularly cardiovascular disease, cancer, injuries, musculoskeletal diseases and neurological conditions.

The University-wide transdisciplinary *Engineering Solutions for Health: Biomedical Engineering* research strategy has connected over 300 researchers from multiple faculties and built a strong foundation in research excellence, entrepreneurial thinking, innovation, and advanced technology with strong connections to industry and community.

The University of Calgary has a critical mass of facilities and research expertise and is leading biomedical engineering research with collaborative teams focused on **human mobility, health monitoring, advanced biomedical imaging, precision biodiagnostics, regenerative medicine and novel medical technologies**, our researchers are transforming quality of life and continuously improving the health system.

Contact us to learn more about our integrated teams across the Schulich School of Engineering, Cumming School of Medicine and the Faculties of Kinesiology, Science, Nursing and Veterinary Medicine. [bme@ucalgary.ca](mailto:bme@ucalgary.ca)

[ucalgary.ca/bme](https://ucalgary.ca/bme)



UNIVERSITY OF  
CALGARY



The Alberta Children's Hospital Research Institute (ACHRI) was founded in 2009 as a partnership between the [University of Calgary](#), [Alberta Health Services](#) and the [Alberta Children's Hospital Foundation](#). Our shared vision is to support research for the health and wellness of children and families.

More than 330 passionate ACHRI researchers work in laboratories and as health care providers in hospitals, clinics and in the community – all with the goal to make a difference in the lives of children and their families through new discoveries, better treatments and public health policies.

We couldn't do what we do without the generous support from our community through the [Alberta Children's Hospital Foundation](#), and our collaborations with [Alberta Health Services](#).

We focus on building capacity, integrating research and clinical care, and partnering with our community to solve the most pressing challenges facing children and families here and beyond.

ACHRI supports researchers by offering research space, leading-edge technologies, expert research services and funding support. We invest in the next generation of scientists through trainee scholarships, knowledge translation opportunities, and trainee awards.

The University of Calgary and the Alberta Children's Hospital are now first in Canada to make child health a priority for research. The Child Health and Wellness Strategy is led by [ACHRI](#) in partnership with [Alberta Health Services](#), the [Alberta Children's Hospital Foundation](#), and our visionary community to create a better future for children through research. This collaborative community includes investigators from: [Arts](#), [Cumming School of Medicine](#), [Kinesiology](#), [Nursing](#), [Owerko Centre](#), [Schulich School of Engineering](#), [Science](#), [Social Work](#), [Veterinary Medicine](#) and [Werklund School of Education](#).

Collaborations with [Cumming School of Medicine Research Institutes](#), [Infections, Inflammation and Chronic Diseases](#), [Human Dynamics in a Changing World](#), [Engineering Solutions for Health, Brain and Mental Health](#), [ii' taa'poh'to'p](#) and [UCalgary Equity, Diversity and Inclusion](#) are critical to accelerating outcomes.



# About the Libin Cardiovascular Institute

*Connecting cardiovascular research, education and care*

The Libin Cardiovascular Institute is a joint entity of Alberta Health Services and the University of Calgary that connects all cardiovascular research, clinical care and education in Southern Alberta. It serves a population of about two million. Our more than 1,500 members include physicians, clinicians and other health professionals, researchers and trainees from a range of disciplines.

The Libin Cardiovascular Institute was established on Jan. 27, 2004 thanks to a generous foundation from the Alvin and Mona Libin Foundation. The Libin Cardiovascular Institute is the only institution in Canada to offer a single cardiovascular program, which promotes a high standard of care across the city and region.

## **Our Mission**

We will leverage our unique capabilities to advance patient-centered, value-based “next” practices that will enhance patient reported outcomes, increase access to care and improve quality at the same time as reducing costs.

## **Our Vision**

To lead and transform health care using precision cardiovascular health platforms.

## **Our Members**

- Educate and train the next generation of health-care providers and researchers.
- Provide world-class treatment for patients.
- Conduct ground-breaking clinical and basic science research.

## **Our Key Initiatives**

### **Clinical Innovation Initiative**

The Clinical Innovation Initiative exists to connect clinician-scientists and researchers within the Libin Cardiovascular Institute to bolster the academic acumen and leadership potential of the Institute’s clinical members. The initiative actively supports and engages the physicians, nurses, nurse practitioners and other health-care providers affiliated with the institute. Activities within this initiative include peer support, mentorship, wellness initiatives, clinical program development, staff education needs and fostering relationships between clinician-scientists and researchers.

### **Person to Population Research Group (P2)**

P2 is a multidisciplinary team of researchers and clinicians committed to improving cardiovascular health in Alberta at the individual and population level. We conduct epidemiological, clinical and health system research with the goal of improving the health of all Albertans, including defined groups who may be at higher risk due to lifestyle, environment, financial and social factors. Our goals are to increase awareness of the impact of these factors for the prevention, care, and outcomes of Albertans; increase the provision of personalized care; improve collaboration among scientists in Alberta; reduce overall risk of cardiovascular disease in Alberta. Our members have knowledge and expertise across a breadth of issues and methods. This includes clinical research, health services research, statistics, health economics and implementation sciences. Learn more at [libin.ucalgary.ca/p2](https://libin.ucalgary.ca/p2).

### **Data Initiative**

The Data Initiative is designed to harness the potential of the vast amounts of cardiovascular data captured by our health system and use it to inform clinical decision-making, advance health research and ultimately improve patient outcomes. The work of the Data Initiative includes linking existing data assets through the development of an integrated cardiovascular data set; developing training and resources; and providing streamlined supports for researchers, clinicians and project teams to access, analyze and use the data to benefit cardiac patients.

### **Women's Cardiovascular Health Initiative**

In 2019, the Libin Cardiovascular Institute introduced the Women's Cardiovascular Health Initiative, a formal program in women's cardiovascular health. Libin members are committed to positively impacting women's cardiovascular health across the life cycle through research, education and clinical care. In addition, we are engaging with the Calgary community and across Southern Alberta to raise awareness about women's cardiovascular disease - the risks, symptoms and recovery.

*Learn more about the Libin Cardiovascular Institute at <https://libin.ucalgary.ca/> or follow us on Twitter at @LibinInstitute, Facebook at @LibinInstituteAB and Instagram at @LibinInstitute. Contact us at [libin@ucalgary.ca](mailto:libin@ucalgary.ca).*

# ***Mobility for Life.***

## **The McCaig Institute for Bone & Joint Health**

Tracing its beginnings back to 1984, the McCaig Institute for Bone and Joint Health is comprised of basic scientists, orthopedic surgeons, rheumatologists, radiologists, kinesiologists and biomedical engineers, all working together to understand, prevent, diagnose and develop new treatments for bone and joint conditions.

### **Vision**

Leading the improvement of musculoskeletal health for patients across their lifespan through research and education.

### **Mission**

To enhance the musculoskeletal health of Albertans by focusing our efforts on a “precision medicine” approach to research: tailoring the right intervention for patients at the right time.

### **Opportunities for collaboration**

#### **The Centre for Mobility and Joint Health**

The Centre for Mobility and Joint Health (MoJo) features state-of-the-art imaging, movement assessment and diagnostic equipment for clinical trials, clinical assessments and research studies. The MoJo is designed to accelerate solutions to bone and joint problems and translate basic science into real-world clinical solutions. The imaging equipment and technology are available for clinicians, scientists and companies on a fee-for-service basis. If you are interested in conducting research at the MoJo, please visit [mccaig.ucalgary.ca/mojo](http://mccaig.ucalgary.ca/mojo) and contact [mojo@ucalgary.ca](mailto:mojo@ucalgary.ca).

#### **The Mobility for Life Project**

The *Mobility for Life Project* is a long-term research study of how bone and joint diseases develop and progress over time. The goal of the project is to form a comprehensive musculoskeletal health database to help researchers identify early indicators of disease, improve diagnosis and target effective treatment. By creating a large pool of pre-qualified participants, the *Mobility for Life Project* aims to make studies focused on musculoskeletal health and disease faster, better, and more innovative. [mccaig.ucalgary.ca/mobility-for-life](http://mccaig.ucalgary.ca/mobility-for-life)

*Learn more at [mccaig.ucalgary.ca](http://mccaig.ucalgary.ca) or contact us at [mccaig@ucalgary.ca](mailto:mccaig@ucalgary.ca)*