Annual Bio-Hackathon and Summer School
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NSERC-CREATE Bio-Hackathon

About

The Annual Bio-Hackathon and Summer School is part of NSERC-CREATE program in *Training in Global Biomedical Technology Research and Innovation* for Graduate Students at the University of Waterloo. This program is the first “Needs-First” Bio-Hackathon for in which trainees work in an interdisciplinary teams, discover unmet needs by directly interact with end-users and stakeholders in the patient, medical, biotechnology industry communities, develop the needs statement, and ideate potential solutions. They present their final “Needs Statement”, solution and design at the final pitch competition.

Program Overview:
## Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Day 1-June 4</th>
<th>Day 2-June 5</th>
<th>Day 3-June 6</th>
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</thead>
<tbody>
<tr>
<td>9:00-9:30</td>
<td>Welcome + Kick off “My experience as a middle-aged new cancer patient” by Scott Leatherdale</td>
<td>9:00-10:30 Needs Analysis and Screening</td>
<td>9:00-12:00 Concept Evaluation and Development</td>
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<td>9:30-11:00</td>
<td>3M Talks</td>
<td>10:30-12:00 Brainstorming techniques</td>
<td>12:00-1:00 Lunch</td>
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<tr>
<td>11:15-12:15</td>
<td>Team Building Activity</td>
<td>12:00-1:00 Lunch</td>
<td>1:00-2:00 Pitch Practice</td>
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<tr>
<td>12:15-1:00</td>
<td>Lunch</td>
<td>1:00-4:00 Panel Discussion (Needs Validation)</td>
<td>2:00-2:30 Presentation Upload</td>
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<tr>
<td>1:00-4:00</td>
<td>Interdisciplinary Collaboration</td>
<td>4:00-4:30 Break</td>
<td>2:30-3:00 Refreshments Break</td>
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<tr>
<td>4:30-6:30</td>
<td>Intro to Design + Needs Finding and Assessment</td>
<td>4:30-6:30 Solution Working Session</td>
<td>3:00-5:00 Remarks+ Final Pitch Competition</td>
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<tr>
<td>6:30-8:00</td>
<td>Working Dinner with Teams</td>
<td>6:30-8:00 Working Dinner with Teams</td>
<td>5:00-5:45 Judge Deliberation and Reception Cocktail</td>
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<td></td>
<td>5:45-6:00 Final Results Announcement</td>
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<td>6:00-7:00 Social Networking Depart</td>
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NSERC-CARETE  
Annual Bio-Hackathon & Summer School  
June 4-6, 2019

Statistics of the Event

Gender
- 30% Male
- 70% Female

Program
- Undergraduate: 29%
- Masters: 68%
- PhD: 3%

CREATE vs non-CREATE
- CREATE: 41%
- non-CREATE: 59%

CREATE

Discipline Diversity
- SYDE: 33%
- Optometry and Vision Science: 8%
- MME: 11%
- SPHHS: 16%
- Chemical Engineering: 5%
- Kinesiology: 8%
- France (UTC): 3%
- ECE: 11%
- Statistics: 8%

Summary
- Total of 37 participants
- 8 teams of 4-5 (Interdisciplinary)
- Theme: Post Cancer Care
- Biodesign Training sessions (Needs Finding, Team building, Concept Evaluation, ...)
- Identifying unmet needs panel discussion by SickKids, GRH, CCCARE
- Industry involvement: mentors, judges, and event sponsorship
- 2 Winning teams
An inspiring talk by Dr. Scott Leatherdale about his personal journey as a cancer patient, discussing challenges any individual faces going through cancer in personal and professional life.

Dr. Scott Leatherdale is a Professor and CIHR-PHAC Chair in Applied Public Health Research in the School of Public Health and Health Systems at the University of Waterloo. His work focuses on advancing a systems science approach to cancer prevention, developing and evaluating population-level health policies across multiple risk factor domains, and creating research infrastructure to facilitate large population studies in chronic disease prevention. His work is purposefully designed to actively engage numerous stakeholders at multiple-levels (regional, provincial, national), and is designed to have an impact on improving the health of large segments of the Canadian population. The core foundation project for his current program of research is the COMPASS System; a prospective cohort study following 70,000+ Canadian youth to evaluate how ongoing and real-world changes to programs, policies, or built environment resources surrounding youth impact multiple cancer-related health behaviours and mental health outcomes over time. Dr. Leatherdale was the inaugural winner of the CIHR-IPPH Trailblazer Award in Population Health Solutions.

Panel Discussion

Identifying Unmet Post Cancer Care Needs

Needs Identified by Canadian Retinoblastoma Research Advisory Board (CRRAB)

Retinoblastoma is a childhood eye cancer, which can have lifelong effects on vision and well-being, including risk of developing second cancers later in life.

- Priority: What second cancer screening is optimal for heritable retinoblastoma survivors?
- Priority: How to provide culturally competent social, emotional and psychological support to retinoblastoma patients, survivors, parents and families (at diagnosis and beyond)?

Needs Identified by Grand River Regional Cancer Centre

- Exercise post-cancer to prevent discharging deconditioned patients
- Weight and nutrition assessments only occur at beginning of cancer process. While the nutrition tool is validated, there is no evidence regarding how often a patient should be reassessed.

Needs Identified by CCCARE (Center for Community, Clinical and Research Excellence)

Strong evidence suggests that regular exercise can prevent colon, prostate, and breast cancer. Exercise also is safe during and after cancer treatment.
## Training Sessions

### Overview:

<table>
<thead>
<tr>
<th>Communication and Presentation</th>
<th>Needs Finding and Assessments</th>
<th>Team Building and Collaboration</th>
<th>Design Ideation and Concept Development</th>
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</thead>
</table>
| • Communicate your Research to a General Audience  
• 3M Thesis  
• Pitch Presentation techniques | • Design Process (Identify, Invent, Implement)  
• Needs Statement: "A way to address (Problem) in (Population) that (Outcome)" | • Five aspects of a good team  
• Team diversity  
• Destructive VS productive conflict  
• Multi-, Inter-, & Transdisciplinary  
• Team charter | • Decision matrix and developing concepts  
• Effect of ‘design fixation’, encouraging meta cognition and awareness in design  
• Rules of Idea Generation  
• Constraint Reversal  
• C-Sketching |

### Interdisciplinary Collaboration

**Facilitator:** Katie Plaisance  
**Learning Objective:** Understand how diversity improves team outcomes. Differentiate between productive and destructive conflict. Recognize the importance of psychological safety and develop a team charter.

"Collaboration, it turns out, is not a gift from the gods but a skill that requires effort and practice."

– Douglas B. Reeves

### Intro to Design / Needs Finding & Assessment

**WATERLOO ENGINEERING**  
**Facilitators:** Tom Willet and Maud Gorbet  
**Mentor:** Lora Giangregorio

Needs Analysis and Screening

**Facilitators**: Tom Willet, Maud Gorbet  
**Mentor**: Thanh Vuong  
**Learning Objective**: The goal of Needs Analysis, screening/selection process. Use of critical thinking, analysis, validation to select a need to work on. Needs specification generation.

Ideation Techniques

**Facilitator**: Rob Gorbet

Learning Objective: The place of ideation in the design process. Practice several specific ideation techniques.

Solution Working Session

**Facilitators**: Catherine Burns, Tom Willet, Maud Gorbet  
**Learning Objectives**: Through application of ideation generate 3 Solution Concepts for their Need. Document concepts on slides.
Facilitator: Oscar Nespoli  
Mentor: Jen Boger  
**Learning Objectives:**  
- Teach the practical and effective use of the decision matrix for selection and developing concepts  
- Demonstrate the importance of selecting a useful datum  
- Demonstrate the effect of ‘design fixation’, encouraging meta cognition and awareness in design  
- Identify technical contradictions and removal of such using a separation principle  
- Communicate accurately and effectively

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Facilitator: Valerie Walker  
**Learning Objective:** Techniques of giving an effective presentation to an educated but non-specialist audience through storytelling.

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Facilitator: Kira Bruschke  
**Learning Objective:** Building up a team dynamic, effective teamwork, and communication

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Facilitator: Emily Peat  
**Deliverable:** Ensure that the required components are in the presentation file, and practice for the final competition presentation.
Teams Introduction

First Place Winners:

Lymfreedema

- Paula He, MSc, Kinesiology
- Cederick Landry, PhD, MME
- Emma Tung, MASc, Kinesiology
- Catherine Wang, Undergraduate, Statistics

Second Place Winners

Detect-A-Dot

- Martine McGregor, PhD, MME
- Kawtar Ghiatt, MASc, SYDE
- Ibrahim Ben Daya, PhD, SYDE
- Lori Pollit, MSc, Optometry and Vision Science
- Larissa Ugaya Mazza, SPHHS

Teams (Alphabetical Order)

Cander

- Amanda Nova, MASc, SPHHS
- Nargess Heydari, PhD, SYDE
- Jonathan Rasmussen, MASc, Chemical Engineering
- Fairuz Hoque, MASc, SYDE
- Daniel Dapaah, PhD, SYDE

Inside Out

- Abdollah Pil Ali, PhD, ECE
- Arlene Oetomo, MSc, SPHHS
- Joanne Qiao, MASc, Optometry and Vision Science
- Zahra Haghpanah, MASc, SYDE
LiveWork

- Andrew Smiles, MASc, SYDE
- Matteo Ponzano, PhD, Kinesiology
- Sadaf Mohsenkhani, SYDE
- Tatiana Bevilacqua, PhD, SPHHS

PlateUp!

- Julia Goyal, PhD, MME/SPHHS
- Nijani Nagaarudkumaran, MSc, Optometry and Vision Science
- Jun Ahn, MASc, ECE
- Surya Neti, MASc, SYDE
- Yutong Jin, MASc, Optometry and Vision Science

Rural Heart Health Monitoring

- Fan He, MASc, SYDE
- Sabrina Mattiassi, MASc, Chemical Engineering
- Aravind Ravi, MASc, SYDE
- Fatimata Ndiaye Sarr, Graduate Student, SPHHS
- Alan Yee, Optometry and Vision Science

Social Accountability

- Robin Murdok, MASc, MME
- Vivian Chan, MASc, Optometry and Vision Science
- Yirou (Chris) Li, MASc, SYDE
- Dana Toameh, MASc, SYDE
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Gallery

Photography by: David Wulff and Matthew Robichaud
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Organizational Committee

Catherine Burns, Professor, Systems Design Engineering and Executive Director, Centre for Bioengineering and Biotechnology, University of Waterloo

Thomas Willett, Assistant Professor, Systems Design Engineering, and Biomedical Engineering Program, University of Waterloo

Maud Gorbet, Associate Professor, Biomedical Engineering, Interim Chair, Systems Design Engineering, University of Waterloo

Catherine Burns, Project Coordinator, Centre for Bioengineering and Biotechnology, University of Waterloo

Parisa Hamilton, Project Coordinator, Centre for Bioengineering and Biotechnology, University of Waterloo

Oscar Nespoli, Continuing Lecturer, Mechanical and Mechatronics Engineering, University of Waterloo

Rob Gorbet, Associate Professor and Chair, Department of Knowledge Integration, University of Waterloo

Katie Plaisance, Associate Professor and Associate Chair, Knowledge Integration, University of Waterloo

Lora Giangregorio, Associate Professor, Department of Kinesiology, University of Waterloo

Jennifer Boger, Assistant Professor, Systems Design Engineering, University of Waterloo

Lora Giangregorio, Project Coordinator, Centre for Bioengineering and Biotechnology, University of Waterloo
Guest Facilitators

**Kira Bruschke**, Graduate Career Advisor, Centre for Career Action, University of Waterloo

**Valerie Walker**, Writing and Multimodal Communication Specialist, Writing and Communication Centre, University of Waterloo

**Emily Peat**, Undergraduate BETS and E Co-op Advisor, Conrad School of Entrepreneurship and Business, University of Waterloo

**Sarah Howard**, Graduate Student Experience Specialist, Graduate Studies and Postdoctoral Affairs, University of Waterloo

**Thanh Vuong**, Head of Intellectual Properties at Synaptive Medical

Synaptive

**Matthew James Borland**, Lecturer, Systems Design Engineering, University of Waterloo

**Josh Richmond**, Vice President, R&D, Surgical Systems, Synpative Medical

**Carla Girolametto**, MA, MSc, CCRP-Director Research, Innovation & Clinical Trials, Grand River Hospital

**Zach Weston**, Manager, Performance, Waterloo Wellington Local Health Integration Network

Office of Research and Innovation
Grand River Hospital

Waterloo Wellington LHIN
Panelists

Carla Girolametto: MA, MSc, CCRP-Director Research, Innovation & Clinical Trials

Hanna Stracey: MN, NP- Nurse Practitioner

Margaret Mayer: MScN, NP, CONC- Nurse Practitioner- Hematology

Helen Dimaras: PhD, Scientist, The Hospital for Sick Children Steering Committee member, The Canadian Retinoblastoma Research Advisory Board

Ivana Ristevski: BComm, Parent in Research, The Hospital for Sick Children Retinoblastoma Champion and Steering Committee member, The Canadian Retinoblastoma Research Advisory Board

Richelle Badellianage: BSc, Retinoblastoma Champion and Steering Committee member, The Canadian Retinoblastoma Research Advisory Board

Caryl Russell: Director of UW Fitness, UW WELL-FIT cancer exercise programs
Volunteers

Matthew Robichaude, Master Student, System Design Engineering, University of Waterloo
Bio-Hackathon Mentor

David Wulff, PhD Candidate, Chemical Engineering, University of Waterloo
CBBSAT Ambassador 2018

Hanaan Deen, Program Support Assistant, Centre for Bioengineering and Biotechnology, University of Waterloo

Max Wu, Undergraduate Student, Biotechnology, Science, University of Waterloo

Yashveer Soni, Undergraduate Student, Nanotechnology Engineering, University of Waterloo
Acknowledgements

Organizer: Centre for Bioengineering and Biotechnology (CBB)

We would like to acknowledge support from NSERC–CREATE, Training in Global Biomedical Technology Research and Innovation at the University of Waterloo. [CREATE Funding 401207296]

Sponsors

Centre for Bioengineering and Biotechnology (CBB)

Contact: cbb@uwaterloo.ca
@WaterlooCBB

NSERC- Collaborative Research and Training Experience Program (CREATE)

Intellijoint Surgical Inc.
809 Wellington Street N., Unit 2
Kitchener, ON, N2H 5L6
Canada

Synaptive Medical
555 Richmond Street West
Suite 800 Toronto, ON
M5V 3B1
Canada

StarFish Medical Headquarters
455 Boleskine Road
Victoria, BC, V8Z 1E7
Canada
International Partners

French-Canadian BIOMEDInnov Program

Link: https://uwaterloo.ca/bioengineering-biotechnology/partnerships/international-partners/france
Testimonials

We asked our participants

*If you can take **ONE lesson** home from the Bio-Hackathon what would it be?*

They replied:

“How not to go from solution to need.”

“Networking. People there were really kind and willing to collaborate and exchange knowledge and experiences. I really loved this.”

“Everyone comes with strengths. Effective teams utilize everyone’s strengths rather than expecting everyone to be good at the same thing.”

“We’re all capable of developing solutions to big problems, no matter if we’re students or industry professionals!”

“It is a great experience and there was a lot to learn! “

“Importance of first identifying a need. “

“There are struggles for cancer patients even after they are cancer free.”

“To succeed all member of the team need to be on the same page.”

“Importance of creating safe place in team for productive collaboration.”

“There is more than one perspective to any challenge, try and find several before trying to solve it.”

And many more...
To learn more about the Annual Bio-Hackathon and summer school program
Visit: [https://uwaterloo.ca/bio-hackathon-summer-school/](https://uwaterloo.ca/bio-hackathon-summer-school/)
Contact: Cbb.hackathon@uwaterloo.ca

To learn more about CREATE program or Centre for Bioengineering and Biotechnology
Visit: [https://uwaterloo.ca/bioengineering-biotechnology/nserc-create](https://uwaterloo.ca/bioengineering-biotechnology/nserc-create)
Contact: cbb@uwaterloo.ca

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