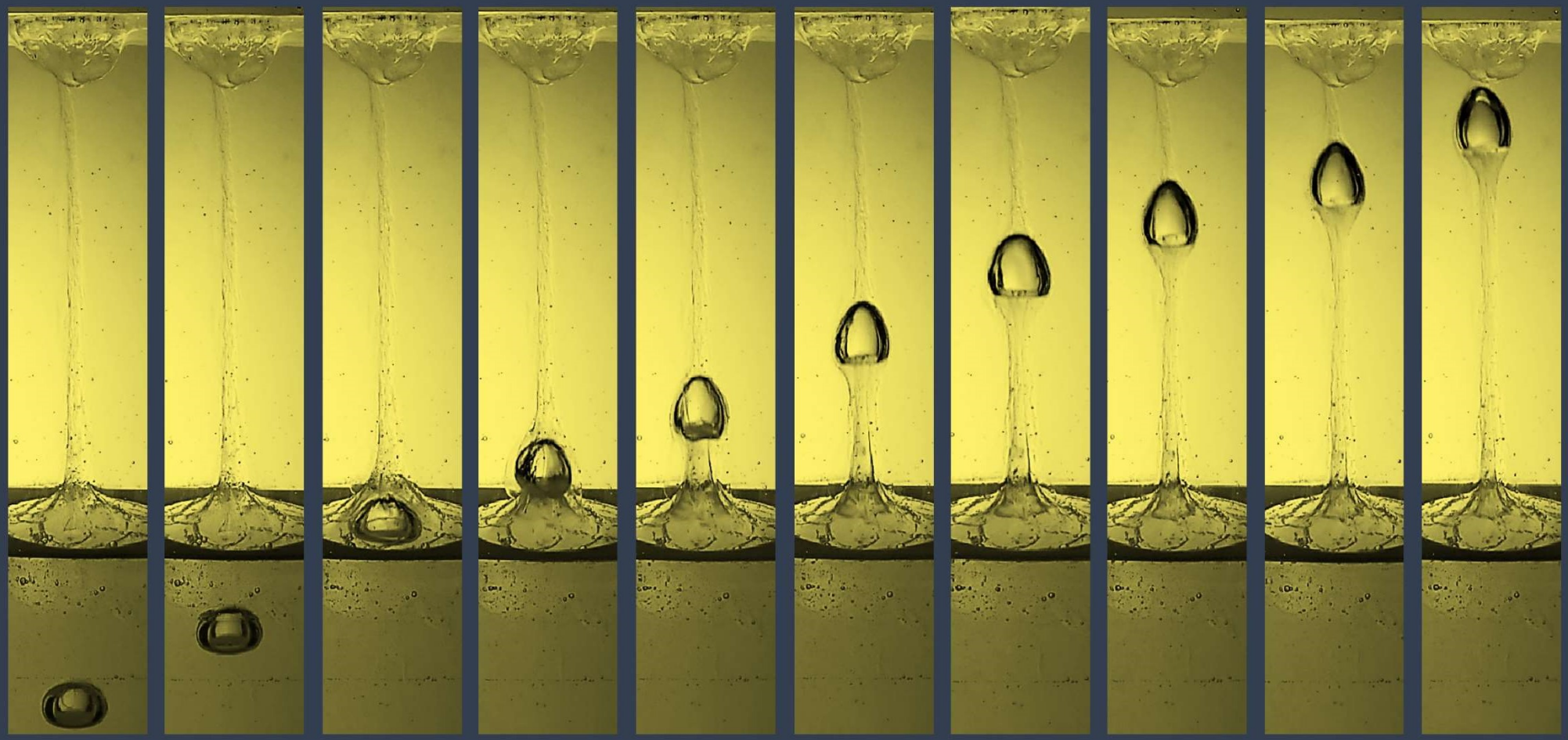
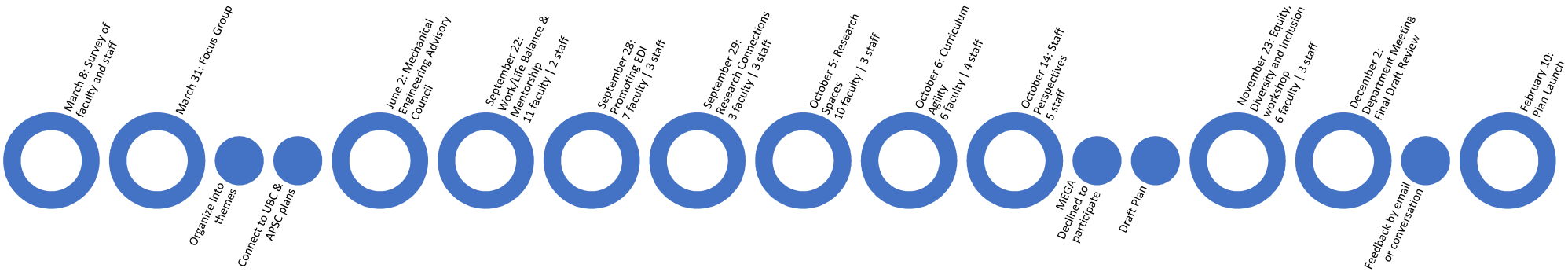


DEPARTMENT OF MECHANICAL ENGINEERING

2022 Strategic Plan

THE UNIVERSITY OF BRITISH COLUMBIA



2021: Process

Our strategic plan was created through a participatory and inclusive process where members of the Department could opt to participate as they wanted. Faculty and staff were engaged directly, and students were invited to participate through the Mechanical Engineering Graduate Association and the Mechanical Engineering Club (undergraduate).

In the spring, a survey and a focus group suggested broad areas of engagement. These were crafted into three themes. Each theme is connected to several parts of the UBC and APSC strategic plans. Three strategies were identified for each theme.

In the fall, seven focus groups were convened around these themes and opportunities. Over seventeen hours of discussion, specific action items emerged and were converged on. These formed the basis of the strategic plan.

After presentation to staff and faculty in early December, the plan was finalized and launched on February 10, 2022.

Cover: "Bubble propagation from a Newtonian into a viscoplastic fluid," Ali Pourzahedi, Marjan Zare, Ian Frigaard

Themes and Strategies: At a Glance

Prioritize People

- Create people-friendly policies that promote work-life balance
- Promote equity, diversity and inclusion in teaching and research
- Enrich our community through mentorship

Invest in Research

- Invest in shared, modern research spaces that support collaboration
- Increase connections with industry and academia, locally and internationally
- Increase support for students

Make Curriculum Agile

- Increase flexibility in the undergraduate program
- Build student-focused, adaptable graduate programs
- Bring research into the classroom through advanced courses

Prioritize People

- Create people-friendly policies that promote work-life balance
- Promote equity, diversity and inclusion in teaching and research
- Enrich our community through mentorship

7

Lead as a first-choice place to learn and work

UBC's Next Century

Work-life culture

Foster a culture which values wellness, balance and joy

APSC #5

Truth & Reconciliation

Demonstrate an authentic commitment to Truth and Reconciliation and value traditional ways of knowing APSC #8

Inclusive respectful leaders

Build competencies required to be inclusive leaders and create spaces for respectful engagement APSC #9

Advance diversity

Ensure the composition and leadership structures of the Faculty reflects the diversity of the communities we serve APSC #10

UBC Mechanical Engineering is centered on its people. Prioritizing people is acknowledging that we are a connected community that works together to succeed both as a group and as individuals.

•O•

Create people-friendly policies that promote work-life balance

Having people-friendly policies ensures we recognize the energy and passion faculty and staff members put into their roles. By appreciating the whole person, we promote physical and mental wellness and workplace satisfaction, enabling excellence in everything we do.

Our first people-friendly policies will center on reducing faculty administrative burden. We will **be strategic about faculty meetings,** adopting a "flipped classroom" approach and acknowledging the cost of a meeting minute when setting an agenda.

We will also be more thoughtful about faculty service duties and recognition. **We will review all committees and disband those not required.** All **new regular and ad hoc committees will need to be formally proposed**, including the purpose and scope of the committee, time commitment, and whether lived experience in an equity-deserving group is required. Large ad hoc committees will be planned for and treated as standing committees, with service assignments balanced. We will create **rule transparency around committee membership,** including representation of equity-deserving groups, inclusion of and role of staff members, clarifying standards for expected service at different ranks, and identifying committees that are helpful for junior faculty to experience. We will also create **better records and organization**, utilizing cloud solutions and assigning staff to archive documents.

•O•

Promote equity, diversity and inclusion in teaching and research

Our people are diverse, with a variety of lived experiences and perspectives. Committing to promoting equity, diversity, and inclusion in teaching and research is formalizing work that has already begun, and will be ongoing.

We will **define an EDI training pathway** for all members of our community, at both introductory and advanced levels, and for members of key committees such as search and merit evaluation committees. We will **evaluate our hiring processes and outcomes** to ensure we are attracting and selecting diverse candidates for faculty.

To weave EDI into the curriculum, we will **introduce courses in Professional Competencies** at both the undergraduate and graduate levels; to better support the inclusion of diverse speakers and examples, we will create a **listing of guest speakers and examples** for instructional use. We will also **explore including diversity statements in graduate admissions.**

•O•

Enrich our community through mentorship

Bringing together a diverse community can be achieved through **mentoring across all career stages for faculty and staff.** We will create a welcoming mentoring program, with transparent expectations and an **online mentoring platform** for support. As joining the Department can be one of the most vulnerable and therefore challenging times, we will focus on an **improved onboarding experience.**

Invest in Research

- Invest in shared, modern research spaces that support collaboration
- Increase connections with industry and academia, locally and internationally
- Increase support for students

1

Lead globally in research excellence, discovery, scholarship and creative endeavors

UBC's Next Century

Innovative spirit

Create time and space for innovation

APSC #7

Strategic partnerships

Collaborate with purpose in strategic, long-term partnerships

APSC #14

UBC Mechanical Engineering research will be characterized by collaboration and connection. Investing in research is strengthening our research community through both physical and relationship infrastructure.

•O•

Invest in shared, modern research spaces that support collaboration

Investing in modernizing our spaces ensures we are able to meet the increasing needs of our researchers while maintaining safe, usable spaces. By moving our infrastructure forward, we create a space for innovation and build a sense of pride in our workplaces.

Investing in our infrastructure includes both continuing to **advocate for new space** and choosing to strategically **invest in existing space.** Working from a safety framework, we will **design adaptable, flexible, and responsive spaces.**

An important part of this process will be **completing a space audit** that goes beyond the normal university audit by including utilities, safety, ceiling height, surfacing, and more. This space audit will complement the creation of **transparent rules on space governance.**

To help reduce underutilized space, we will also **clarify rules around disposal of University equipment** and find additional ways to help faculty manage end-of-use and end-of-life equipment cycles.

•O•

Increase connections with industry and academia, locally and internationally

Community members have individual connections around the world, and we will leverage these to build stronger international connections as a Department, increasing our visibility on the world stage.

Connections start with communication, and we will start **communicating our successes more broadly** utilizing social media and the web in addition to academic channels. We already offer non-technical talks to alumni, but we will extend this into **offering technical seminars to industry.** We will also look into **bringing industry to campus for research experiences.**

We will also investigate **building department-to-department relationships with other institutions,** potentially including joint programs, a speaker series, or other collaborations.

•O•

Increase support for students

Students form the backbone of our research, and providing fair, equitable support is essential to our success. We will work to **increase our support to research students** in a prescribed way. We will also work to **provide additional supports to encourage research students from communities currently underrepresented in the Department**. Support will include research stipends and other financial and non-financial measures that recognize the varied and complex needs of students.

Make Curriculum Agile

- Increase flexibility in the undergraduate program
- Build student-focused, adaptable graduate programs
- Bring research into the classroom through advanced courses

2

Inspire and enable students through excellence in transformative teaching, mentoring, advising and the student experience

UBC's Next Century

Leading-edge teaching

Demonstrate and promote leading-edge curricula and teaching practice

APSC #1

Lifelong value

Create lifelong value across the career continuum

APSC #4

UBC Mechanical Engineering is known for its teaching and educational innovation, and we will strive to maintain this reputation. By making curriculum agile and responsive, we put learner needs first and ensure we can react to changing educational environments.

•O•

Increase flexibility in the undergraduate program

By increasing flexibility in the undergraduate program, we provide students more opportunities to customize their program to meet their unique learning goals and needs, while continuing to guide them through the most essential learning they need to become an effective engineer.

Moving towards a minimal core will provide a myriad of benefits to students, including creating flexibility for those who are pursuing parallel opportunities such as a minor or leadership of a student team. **Streamlining our core curriculum** produces further opportunities and makes it simpler for us to **create options and concentrations that match student demand and faculty expertise.**

We will also **create opportunities for undergraduate research** that including exposing students to concepts of research, getting them into the lab, and **articulating pathways for current undergraduates to complete an accelerated Master's degree.**

•O•

Build student-focused, adaptable graduate programs

Graduate education is evolving, and building student-focused, adaptable graduate programs ensures we are able to attract top students from a variety of backgrounds and meet each of their educational needs.

The base we need for adaptable graduate programs is to **build and identify graduate competencies** for each program. This will allow us to determine the true minimum pathway, creating room for innovation.

Looking at how we offer our research programs, and we will **decouple the MASc and PhD requirements** so we can better respond to the unique needs of students in the programs. At the same time, we will **better articulate graduate pathways** to allow students to pick the program that best suits their needs.

To support these programs, we will **create predictability in graduate course offerings**, offering some courses annually, some bi-annually, and removing old courses from the books.

•O•

Bring research into the classroom through advanced courses

Tying together adaptable undergraduate and graduate curricula are advanced courses. We will **develop best practices for cross-listed courses**, ensuring that undergraduates and graduates who are learning together are all getting the best possible learning outcomes. We will also **explore 600-level courses** specifically for doctoral students.

Progress Map

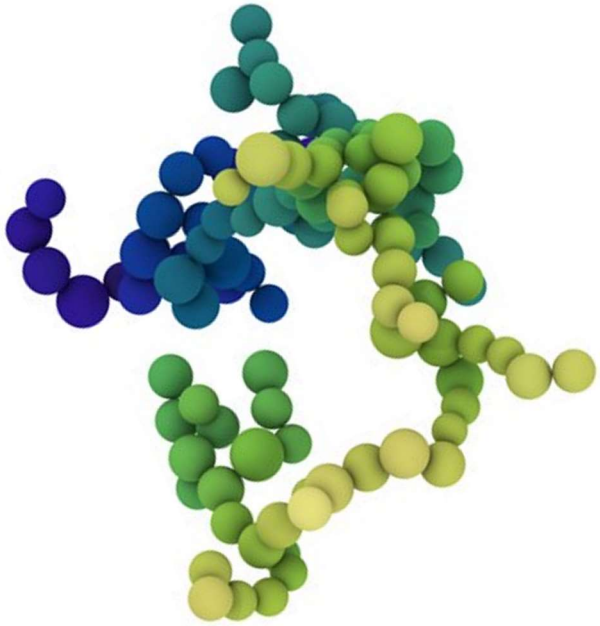
Prioritize People	Invest in Research	Make Curriculum Agile
Policies for work-life balance	**Invest in collaborative space**	**Flexible undergraduate program**
Strategic faculty meetings	Advocate for new space	Minimal core
Committee review	Invest in existing space	Streamlined core
New committee proposal	Guidelines for adaptable spaces	Options and concentrations
Committee membership transparency	Space audit	Opportunities for research
Committee records and organization	Transparent rules on space governance	Accelerated Masters
	Rules on disposal	
Promote EDI in teaching and research	**Increase connections**	**Adaptable graduate programs**
Define an EDI training pathway	Communicate success	Graduate competencies
Evaluate hiring processes and outcomes for EDI	Technical seminars to industry	Decoupled MASc and PhD
Undergrad Professional Competency Course	Bring industry to campus for research	Articulate graduate options
Grad Professional Competency Course	Connect to other institutions	Predictable course offerings
Listing of guest speakers and examples		
Diversity statements in graduate admissions		
Mentorship	**Support students**	**Advanced courses**
Mentoring for new faculty	Increase financial support to students	Cross-listed course best practices
Mentoring for all faculty	Financial support for underrepresented groups	600-level courses
Mentoring for new staff	Other supports for underrepresented groups	
Mentoring for all staff		
Online mentoring platform		**LEGEND**
Improved onboarding		New - priority for next year
		Work underway
		Pilot underway
		Pilot complete

Tactical Notes

One of the largest challenges in implementing the strategic plan is managing the considerable resources required, in particular the time needed for thoughtful, deliberate, and engaged implementation.

In executing this plan, UBC Mechanical Engineering will consider the following key tactical notes:

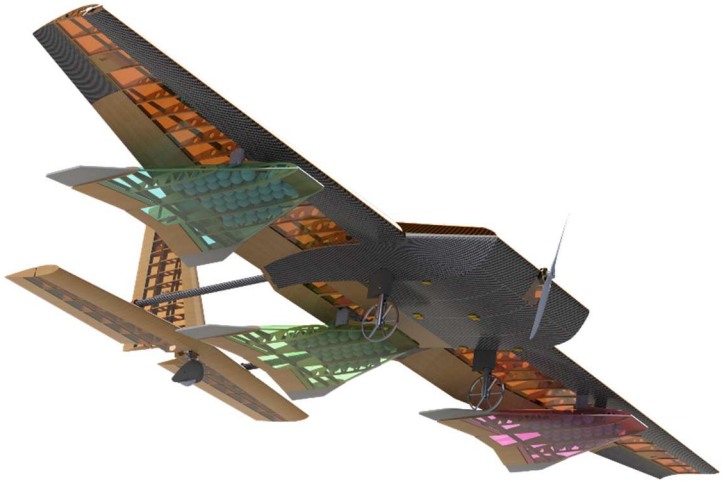
- Creating radical transparency in discussion and outcomes;
- Finding safe ways for concerns to be raised, and making those pathways visible;
- Sharing lessons learned, problems discovered, solutions found, and issues faced in everything we do;
- Being explicit about effort required for tasks and projects and recognizing that there is limited human resource capacity;
- Creating strategies for cohesive approaches to problems, such as a technology strategy that looks at how we offer hybrid classrooms or what software menu we expect students to be familiar with;
- Utilizing low cost approaches where possible, particularly if students are expected to shoulder costs, such as moving towards low-cost and free textbooks.



This page: "Soot is a sub-micron fractal-like structure with unique transport and optical properties, which are of high interest in air pollution and global warming models. At Aerosol lab, we recently started generating numerical soot aggregates in order to improve the image processing algorithms we use to extract soot properties from our microscopic samples," Hamed Nikookar, PhD student

Back cover: "Advanced 2021," UBC Aerodesign Student Team

"These images of biodiesel combustion were taken using two different cameras to view the natural luminosity of soot (top row) and the OH-chemiluminescence (bottom row). The natural luminosity of soot provides qualitative information about regions of soot production, while the OH*-chemiluminescence images allow for quantitative calculations of reaction rates and reaction zone growth. These images will serve as a baseline for further combustion imaging of new biofuels produced from potentially renewable feedstocks," Isaac Becker, MASc student*



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