

## Statement of Intent for a New Program

Proponent's Contact Information	
New Program Name (degree and discipline):	Bachelor of Engineering in Integrated Engineering (B.Eng.)
Academic Unit Proposing the Program:	Department of Engineering, Faculty of Mathematics and Science
Proposed Start Date:	September 2024
Submitted by:	Beatrice Ombuki-Berman, Interim Chair, Engineering Greg Finn, Special Advisor
Email:	<a href="mailto:bombuki@brocku.ca">bombuki@brocku.ca</a> , <a href="mailto:gfinn@brocku.ca">gfinn@brocku.ca</a>
Date of Submission:	February 1 <sup>st</sup> , 2022

The Statement of Intent will reference the evaluation criteria for new programs (IQAP Section 3.5) as appropriate and shall include:

Description of the Proposed Program
Provide a description of the program, clearly stating the purpose, structure and pedagogical rationale, including an explanation of the proposed degree nomenclature.
<p>Brock is one of only two comprehensive universities in Ontario that does not offer engineering programs, the other being Wilfrid Laurier University which will introduce engineering programs at its Milton campus.</p> <p><b>Vision:</b> Create new academic programming in engineering, grounded in a transformative work-integrated learning approach, that will prepare students to address the technological, engineering and social innovation challenges of the world in support of job creation, business development, community development and social inclusion across the Niagara region and beyond.</p> <p><b>Mission:</b> To offer engineering education and support engineering research in a manner that is authentic to the spirit and character of the University, that is aligned with its culture and informed by its values. Engineering at Brock will strive to be distinctive and focused on the particular challenges faced by the Niagara region and beyond.</p> <p>Engineering programs at Brock will serve to educate a Humanist Engineer through engineering education that teaches ‘outside the book’ without sacrificing technical proficiency. The Engineering program at Brock is being created to address the ongoing digital revolution in engineering driven by technologies such as AI, robotics, 3d printing, digital twins, virtual and augmented reality, and beyond. At the same time, new areas of focus such as sustainability, diversity, inclusion, and collaboration are driving new engineering priorities. This revolution is transforming traditional engineering fields, driving engineers to be more flexible and interdisciplinary in their approach. Our Integrated Engineering program is tailor-made to address these new demands on engineering careers. Our students will gain a grounding in core engineering</p>

practices and the necessary interdisciplinary outlook to make a significant impact in the engineering fields of the future.

The Brock undergraduate engineering program will educate students to consider the challenges of the future by structuring learning around four principal themes:

*Feeding the World* - agri/food-tech, environment, water, bio commodities, bioremediation  
*Shaping the Future* - robotic automation, advanced manufacturing, infrastructure, transportation logistics, energy frontiers, human augmentation  
*Connecting the World* - big data, deep learning, artificial intelligence, fintech, hyper-connectivity, cybersecurity  
*Creating Healthy Communities* - medical devices, well-being, smart/compassionate cities, sustainability, climate change

This vision will be achieved through:

- Offering students the opportunity to undertake a high-quality, relevant and distinctive engineering education experience in Niagara
- Enhancing the student experience by providing opportunities for work-integrated learning and research
- Encouraging innovative integrated engineering research through providing central access to knowledge, equipment and resources
- Enabling the exchange of ideas and methodologies between engineering experts through hosting seminars, symposiums and workshops
- Facilitating the interaction of faculty members with the wider community through arranging collaborative projects

Brock University is committed to promoting inclusivity in engineering education with an overall aim to achieve gender balance, equity, diversity, as well as meaningful indigenization. Students with a wide variety of backgrounds and qualifications will be encouraged to apply for entry to the program. The goal of the program is to produce graduates who are skilled in communication, instinctively collaborative and inherently trans-disciplinary in their approach to problems. A Brock engineering graduate will be imbued with an appreciation of both the context and the implications of their work and engaged in their local and global communities.

The program being introduced is in the field of Integrated Engineering, which is not defined by the traditional engineering disciplines and programs. Integrated engineering combines the fundamental and core engineering principles (electrical, mechanical, chemical, etc.) through project-based delivery methods. The program will cover engineering science and engineering design and will also draw on some courses from mathematics and natural sciences, and from across other Faculties at Brock. In addition to the program learning outcomes (PLO) aligning with the University's degree level expectations for undergraduate programs, the PLOs will be aligned with the graduate attributes and indicators to meet accreditation requirements by the Canadian Engineering Accreditation Board of Engineers Canada. This body has responsibility for recommending approval and/or renewal of undergraduate engineering programs across the country.

Development of the full B.Eng. program and its various components is currently underway

Explain how the proposed program fits with the University's strategic plan.

The above 4 themes address current global challenges, as well as align with regional and national employment opportunities. In addition, these themes align with the strategic priorities, goals and actions defined in Niagara Roots - Global Reach, Brock University Institutional Strategic Plan 2018-2025.

## **Offer a transformational and accessible academic and university experience**

### *Professional Education*

Engineering programs in Canada are accredited by Engineers Canada, providing program graduates with the opportunity to use the “P.Eng.” designation. Students entering Brock’s engineering programs will learn beyond the subject matter that they will need to understand to be successful in their future careers. They can expect a broad and multidimensional experience to prepare them specifically for the future working environment.

Harnessing the experience and the expertise available through Brock’s Co-op, Career and Experiential Education office will be essential to build an experience for students. The introduction of engineering programs will continue to build on our existing experiential education foundation, enhancing Brock’s position in this area and will serve to ensure that our engineering graduates stand out from other universities without this critical component in place. While many engineering Faculties have adopted the successful Waterloo co-op model, there is the potential to develop other imaginative and flexible work-integrated learning approaches that reflect the aspirations of today’s students and employers. Brock’s leadership in integrating career education in the curriculum, and alongside the students’ experiential opportunities, will ensure that students have both the experiences needed for the workforce, but also the knowledge to translate those experiences and skills to the engineering industry.

### *Transdisciplinary Structure and Culture*

Brock has an opportunity to design an engineering program that is truly committed to engaging transdisciplinary challenges and reflective of the multi-dimensional issues facing those born into this century, unencumbered by many of the structural and cultural borders that too often persist in traditional engineering schools.

## **Build Research Capacity across the University**

### *In the Natural and Physical Sciences*

The University’s increasing depth in mathematics and sciences provides a foundation on which to develop a set of engineering programs. The expertise and experience within the Faculties of Mathematics & Science and Applied Health Sciences will be essential in the creation, support and delivery of engineering education at Brock. In particular, the existing emphasis on life sciences (biomedical sciences, biotechnology, biochemistry, etc.) and human well-being (public health, child health, community health, etc.) offers broad scope for Brock to introduce programs in engineering that transcend traditional disciplines and that focus on biological and human-centric technology, which are among the emerging fields in demand from students and employers alike. The emerging trends in IT, artificial intelligence, robotics, internet of things and cybersecurity, etc., calls for a natural collaboration between Engineering and Computer Science. As well, the Department of Mathematics and Statistics will play an important role in mathematical course delivery and expertise in areas such Big Data.

### *In the Humanities, Social Sciences and Goodman School of Business*

Engineering is more than applied science. The essence of engineering is the transformation of the natural environment for the betterment of the economy, society and humanity. One of Brock’s greatest strengths as it embarks on developing engineering education is the institution’s outstanding reputation in humanities and social sciences. The strengths of Brock University in these fields represent a significant opportunity to train future engineers with a broader understanding of their role in society, leaving them better equipped to tackle the challenges in technology. Brock’s research focus in this area - including the Centre for Digital Humanities will be a hugely important asset as the University seeks to introduce an engineering program that stands out and which bridges the divide between humanities and technology. Engineering students will need entrepreneurship and other business skills to better compete in the current market.

The addition of engineering research and teaching can also serve as a point of attraction for potential Canada Research Chairs or Industrial Research Fellows with an interdisciplinary focus.

### **Enhance the life and vitality of our local region and beyond**

#### *Sustainability*

Brock's long-term commitments to the environment were outlined in the 2018 Sustainability Plan. Brock has a well-established Master's program (and a Minor) in Sustainability & Society, and several research units focused on these transcendent issues, including the Environmental Sustainability Research Centre. Together with Engineering, it will place Brock at the epicenter of integrated environmentalism and make Niagara a place where economic progress can go hand-in-hand with sustainability. Engineering at Brock will clearly align with the University's sustainability values and commitments by putting sustainability among the thematic priorities of the engineering program. Considering the location of Brock in a UNESCO Biosphere Reserve, the importance of environmental protection to ensure the sustainability of the region as a natural and rural system is essential.

#### *Expanding Brock's Partnerships across the Niagara Region*

Engineering offers an opportunity for Brock to develop close and enduring partnerships with industry, in educational delivery as well as research. The sooner employers are actively engaged in the collaborative development of the engineering programs, the greater the scope to create a learning experience that stands out from traditional higher education institutions and that offers students the greatest opportunity to be employable in Niagara, even before they graduate.

#### **Foster a culture of inclusivity, accessibility, reconciliation & decolonization**

Engineering education remains hamstrung by a lack of diversity at every level, including the leadership teams, professors and student bodies. If Canada is to fill nearly 11,000 engineering and engineering managers positions each year<sup>1</sup>, it requires a diverse and inclusive talent pool. There is a pressing need to attract more creative young people and others, more women, members from the 2SLGBTQ community, more Indigenous students and more representative individuals from a variety of socio-economic backgrounds, to see engineering education and careers as a place where they are valued and will gain the skills to prosper in the knowledge economy.

More importantly, the Department will make every effort to have broad representation in its make-up, from the students admitted to the staff and faculty hired. The aim is to increase the inclusion of underrepresented groups in engineering (e.g., women, Indigenous, Black, and 2SLGBTQ+), Departmental hiring committees will utilize national and international organizations that have special interest divisions in its recruiting efforts. The Department will hire 13 tenure-track faculty and 6-8 staff in the next five to seven years, and will set the goal of aligning with Engineers Canada targets of licensed engineers who are women to 30 per cent by the year 2030.<sup>2</sup>

<sup>1</sup> Engineering Labour Market in Canada: Projections to 2025

<https://engineerscanada.ca/reports/engineering-labour-market-report>

<sup>2</sup> <https://engineerscanada.ca/diversity/women-in-engineering>

#### **Details of Resource Implications**

Provide details of the existing and new resources (human, physical and budgetary) required to mount the program.

The Department of Engineering has a number of resources committed to initiate a development of an accredited Bachelor of Engineering in Integrated Engineering (BEng). program

Engineering will start with an initial faculty complement of dedicated engineers and cross appointments listed in the table below.

Position	Weight	Department	Status
Associate Professor Shengrong Bu	1 FTE	Engineering	Filled, October 2021
Associate Professor Amir Mofidi	1 FTE	Engineering	Filled, start date April 1 2022
Assistant Professor Ehsan Samiei	1 FTE	Engineering	Filled, start date April 1 2022
Open Rank position #1	1.0 FTE	Engineering	Position currently being recruited, July 1, 2022 start
Open Rank Position # 2	1.0 FTE	Engineering	Position currently being recruited, July 1, 2022 start
Assistant Professor	1.0 FTE	Engineering	Position currently being recruited, July 1, 2022 start
Assistant Professor Jasneet Kaur	0.5 FTE	Engineering & Physics	Position filled, July 1 2021
Assistant Professor Alonso Zavaleta Fernandez de Cordova	0.5 FTE	Engineering & Biological Sciences	Filled, Start date July 1, 2022
Assistant Professor Glaucio Carvalho	0.5 FTE	Engineering & Computer Science	Position filled, January 2022

The initial faculty complement will be supplemented by additional faculty appointments each year over the next 10 years, reaching a total of ~30 FTEs by 2031.

A Departmental Administrative position has been filled, as of October 18, 2021, to provide administrative support to the new, growing department.

Additional personnel to be hired to support the undergraduate engineering program include:

- 1) Work Integrated Learning Coordinator: works with the Co-op Career and Experiential Education office this position will be dedicated to engineering to forge new relationships with professional engineers outside academia, who will be responsible for the delivery of some curricula in the context of the real-world applications as well as an individual who specializes in career development and skills translation provided.
- 2) Skills Translation Coordinator/Talent Coach: The engineering program will have scaffolded career education embedded throughout the program to assist students in their career exploration, skills translation and successful transition to the workforce. The dedicated Engineering talent coach, to be integrated in the CCEE team, will assist students as they navigate their degree from a career perspective and assist them with hands on resources such as resumes and CV's, to more in-depth guidance conversations regarding reflections on learnings as it pertains to their career.
- 3) Engineering Accreditation Officer

At steady state, the B.Eng. program will require an additional 5-6 learning studios and 2 computer laboratories/classrooms. Much of the student R&D will require accessible makerspace style electronics and smart materials workshops beyond the current Library Makerspace in the Rankin Family Pavilion. In the initial years of offering the program enrollments can be accommodated in existing courses through increased capacity or additional sections. Two dedicated engineering teaching labs/design studios will be required in the short term with future needs, in the medium to long term, considered as part of the consultation regarding space with the Department, Faculty, Facilities Management and the Advisory Committee on Space.

The addition of engineering research faculty will also require significant enhancement to the capabilities of the existing Machine, Electronics, and Glass blowing shops housed in the Faculty of Mathematics and Science.

As part of the submission to establish the Department of Engineering a business case was developed that looked at the short to long term financial impact of introducing undergraduate and graduate programs to the mix of program offerings at Brock. In this analysis, in the first 3-4 years of the engineering programs starting, results in a negative contribution to the university's finances as the new programs are introduced, faculty and staff hired and student enrolments build. However, in year 5 this trend reverses resulting in a positive contribution as the academic programs move towards steady state enrolment, additional programs are added and the faculty complement is stabilized.

#### Evidence of Consultation with Affected Academic Units

Include the results of any consultation with other units that will be impacted by the proposed program. Include evidence indicating the extent to which any participating Department(s)/Centre(s) is prepared to contribute to the proposed program.

Over the past several years various consultations regarding the introduction of Engineering at Brock have been carried out, beginning with the Provostial Committee on Engineering followed by the Academic Advisory Committee on Engineering. As part of the consultation for the Senate process for establishing a new academic department, (Senate 690, May 12, 2021)) a number of stakeholders, both academic and administrative units, provided comment on the proposal. Appendix A to this SOI provides a summary of the consultation process undertaken at that time. In addition to these mandated consultations, prior to the pandemic disruption, numerous personal consultations surrounding the creation of a full set of engineering programs at Brock took place and included the following:

- Registrar (G. Jones) - 6 August 2019
- Chair of Senate (D. Cyr) - 16 August 2019, 28 January 2021
- Dean, FAHS (P. Tiidus) - 27 August 2019
- Chair, Department of Accounting/GSB (F. Elayan) - 16 July 2019
- Director, ESRC (R. Plummer) - 25 July 2019
- Coordinator Datathon, GSB (R. Makken) - 23 July 2019
- Director, Centre for Business Analytics (A. Ayanso) - 22 July 2019
- Director, CCEE (C. Krezek) - 27 June 2019
- Director, Brock LINC (D. Lynch) - 7 August 2019
- Dean, FMS (E. Ahmed) - 6 August 2019, 17 July 2020
- Associate Dean, FOSS (K. Bezanson) - 19 August 2019
- University Librarian (M. Robertson) - 20 August 2019, 19 January 2021
- Chair, Computer Science (B. Ross) - 19 August 2019
- AVP, Information Technology (D. Cullum) 18 January 2021
- Director, Research Services (G. Waters) 4 February 2021

While the Senate document dealt with the establishment of a new academic department it also contained information about the academic programs to be offered. As the full program brief for the B.Eng. program is being developed further consultations will be undertaken across the university to provide updates and seek input on the program development.

#### Evidence of Consultation Regarding Space Needs for the Proposed Program

Include the results of any consultation with the Advisory Committee on Space regarding the space needs for the proposed program.

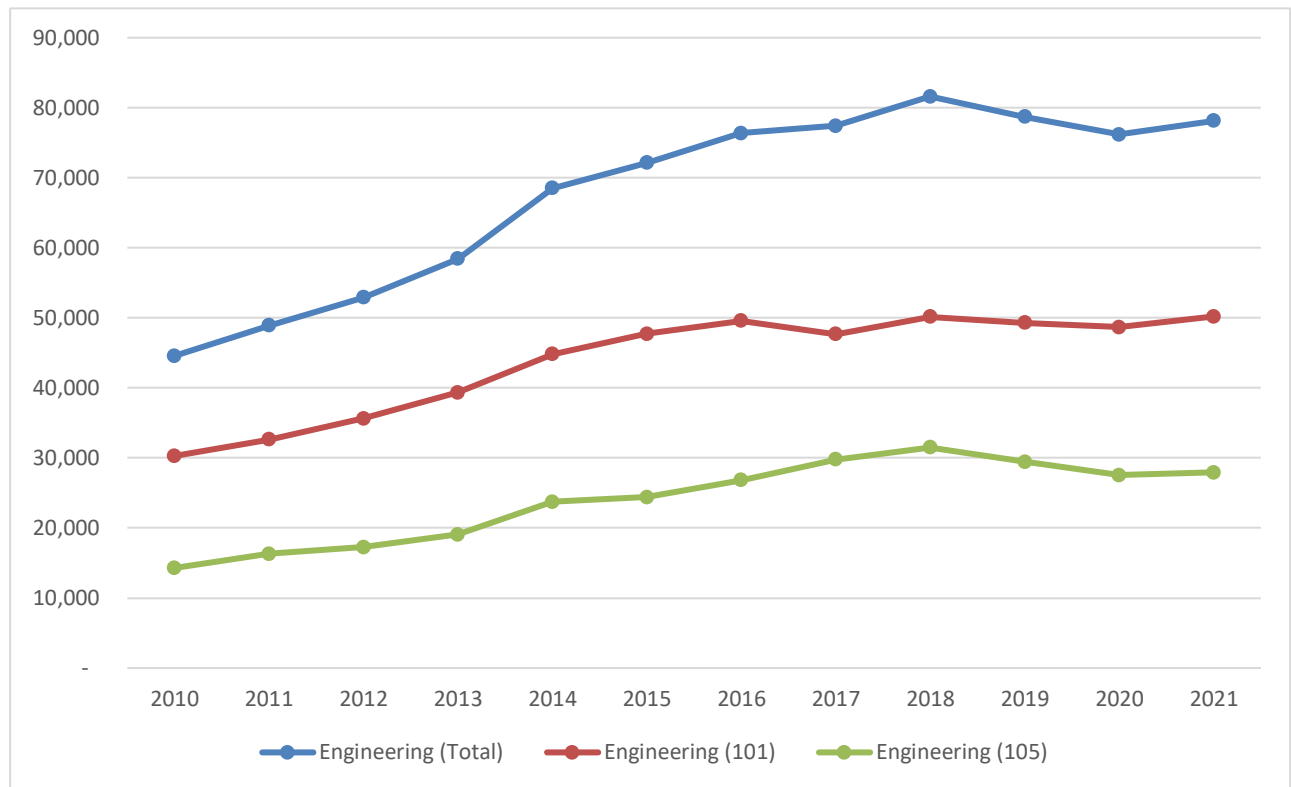
Over the past year the Dean of FMS, Associate Dean (Graduate) of FMS, the Interim Chair of Engineering and the Special Advisor have been working with Facilities Management and the Associate Director, Space Management and Planning to identify and document the space needs for Engineering. This includes classroom and teaching lab spaces, faculty and staff offices, faculty research space, graduate student space and general use (lounges, meeting rooms, etc.). In May 2021 a Space Request Short Form for Engineering was submitted and is currently being amended to reflect new hires. The next step in this process, the Space Request Long Form, is being developed to document the short- and medium-term space needs for Engineering.

Initially, within the Faculty of Mathematics and Science office space for faculty and administrative support have been allocated to Engineering from existing space. Currently, the University administration is exploring a number of avenues with regards to the space needs of the Department of Engineering. This may involve some or a combination of the following: new space through a new build or purchase, leasing of space near campus, and/or re-allocation of existing space within the University.

#### Evidence of Student Demand, including projected enrollments

Engineering has experienced the most significant increase in student demand of any major academic discipline in the last 10 years. In Ontario between 2010 and 2021, there was a 75 percent increase in applications for undergraduate engineering programs (See Figure 1). This compares with a 48 percent overall increase in total applications across all programs to Ontario universities over the same period.

Figure 1 - Undergraduate Engineering Applications 2010 to 2021 (Source: OUAC Application Statistics, various years, COU)

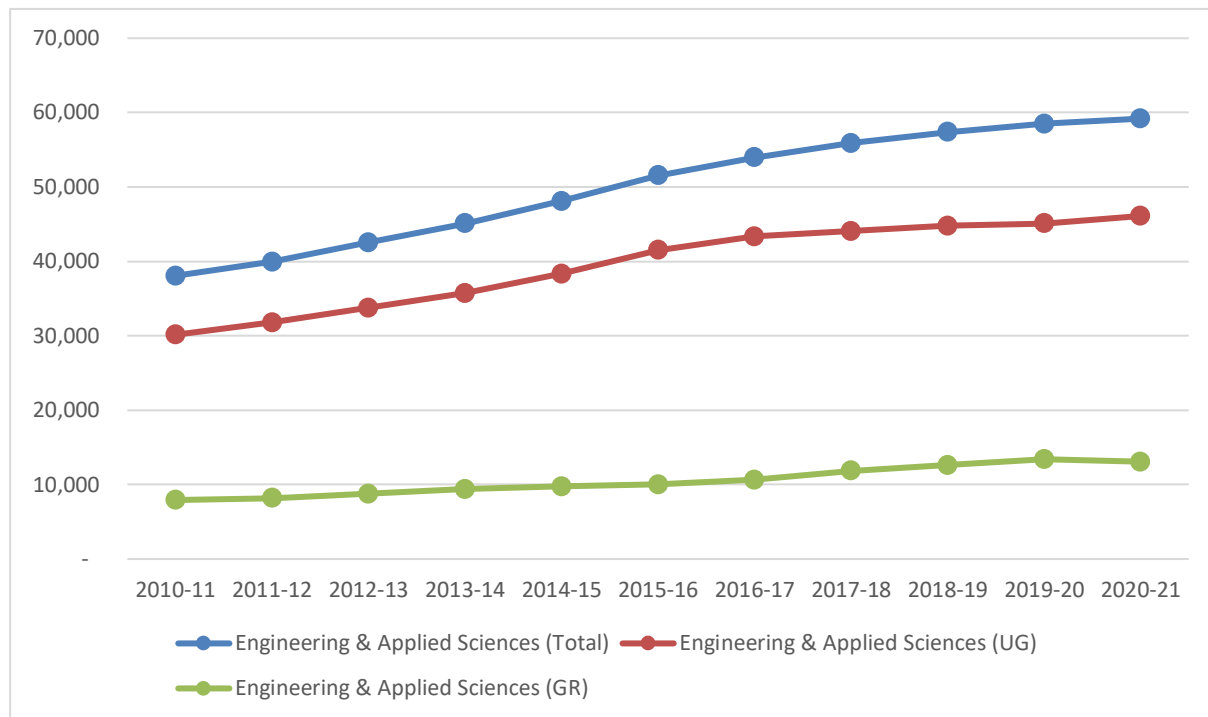


(Source: Ontario University Applications Centre (OUAC) Multi-Year Data <https://ontariosuniversities.ca/resources/data/multi-year-data> (updated to include 2017-2021 application data))

Total enrolment in Ontario university engineering programs during this time has risen by 55 percent (See Figure 2), with undergraduate and graduate enrolments increasing by 52 percent and 65 percent, respectively. This increase in enrolments is only exceeded by mathematical and physical science enrolments (96 percent) with a system average increase across all program of 23 percent.



**Figure 2 - Engineering & Applied Science Undergraduate and Graduate Enrolments - Ontario Universities 2010-11 to 2020-21 (Source: Ministry of Colleges and Universities (MCU))**



(Source: Ministry of Colleges and Universities (MCU) Historical Enrolment-all-table 2000-01 to 2020-21 <https://ontariosuniversities.ca/resources/data/multi-year-data/enrolment> )

With applications continuing to increase, and growing faster than enrolments, there is space to expand capacity for engineering education in the province. Over the past decade, existing engineering programs have grown in size in an effort to keep pace with demand. However, demand still outstrips supply providing an opportunity for Brock University to provide new engineering education opportunities to meet this consistent and ever-growing demand for places from prospective students.

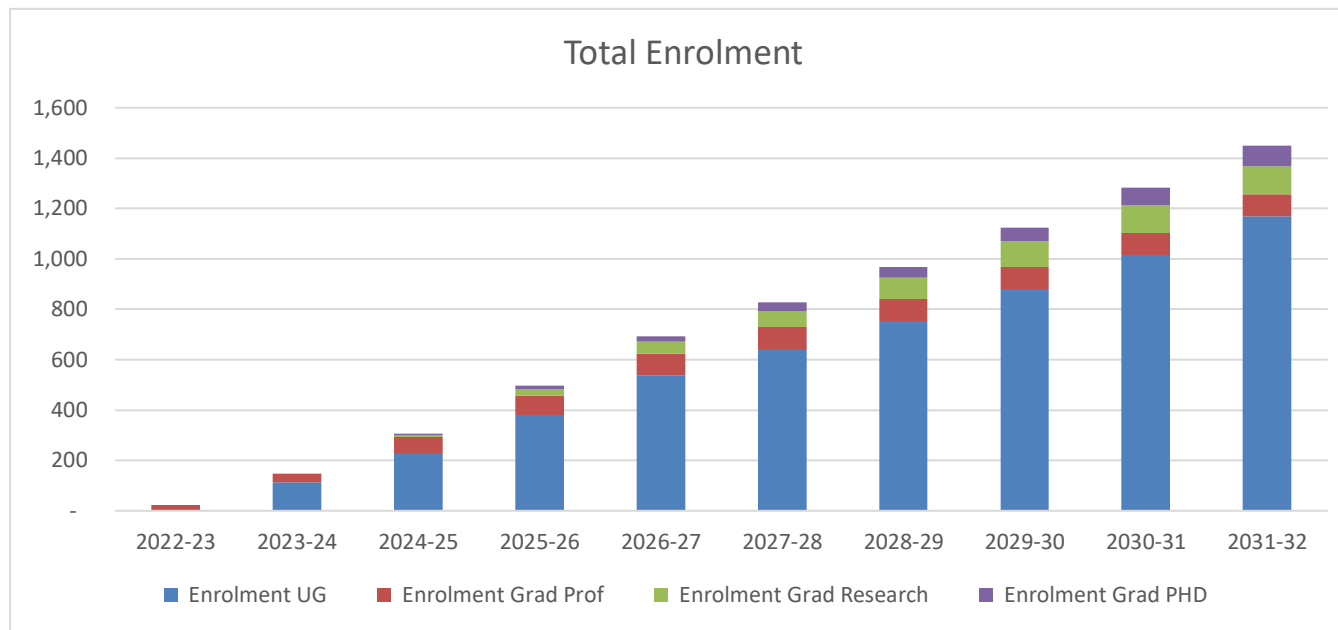
Another important consideration is the distribution of engineering education opportunities across Ontario. Currently, without a professional engineering program locally, Niagara students with an ambition to study engineering must leave the region to do so. For many, this drives up the cost of their education and frequently poses an affordability issue for their families. Brock University was established by the local community to provide exceptional academic learning opportunities for all Niagarans. From the very beginning, it was the intention of the founders to offer a fully comprehensive range of higher education opportunities for local people.

With such a significant increase in demand, both in Niagara and provincially, Brock University now has an opportunity to address this need and to fulfil the University’s founding mission, by offering professional engineering education in Niagara for the first time.

### Projected enrolment

Enrolment projections were included as part of the business case for introducing engineering programming to Brock (See Figure 3). At the undergraduate level these projections include a mix of domestic and international students, with a ratio of 75:25 respectively. This proportion of international students is on the conservative side, but the intention to promote the program globally it is anticipated that the proportion of international students will rise. The enrolment projections also incorporate an attrition rate of 90 percent from year 1 to year 2.

Figure 3 - Projected Undergraduate and Graduate Enrolments 2022-23 to 2031-32



### Adapting to the Changing Expectations of Students

Prospective undergraduate engineering students have limited choices available. While many universities offer a variety of engineering programs in different disciplines, the curriculum and the learning methodologies remain largely similar, limiting flexibility and only suits young people able to make a commitment to a long stretch of learning and the financial investment that requires.

The evidence suggests that prospective engineering students are looking for, and expect, a different type of learning experience to that of their grandparents, their parents and even their older siblings, and to have a variety of options rather than a one-size-fits-all experience.

The proposed program will increase the flexibility of engineering education, providing an opportunity to appeal to a generation that expects choices, and to open up the field to many more people who are unable to make long-term commitments due to their family or financial circumstances. Too many people in Niagara do not have the choice of studying for a professional engineering degree, particularly as they must currently leave the region to do so, and their socio-economic circumstances - rather than their academic potential - dictate their decisions.

In particular, students now expect and demand co-op to be integrated into the learning experience for engineers. This enables many more students to 'earn as they learn', and to avoid racking up debts, and has become the most effective way for graduates to gain employment with many securing long-term jobs from their co-op placements.

There is an opportunity for Brock Engineering to be a leader in developing new flexible learning pathways to attain engineering credentials, and to reimagine the work-integrated learning experience in engineering.

## Evidence of Societal Need

Engineers Canada publishes “[Canadian Engineers for Tomorrow: Trends in Engineering Enrolment and Degrees Awarded](#)”. These reports, updated annually, present data related to enrolment and degrees awarded for the previous 5 years as reported by those institutions who have consistently responded to the survey year-after-year. In 2019 data from 45 higher education institutions is reported. This data looks at trends at the national level and unfortunately does not provide a breakdown at the individual discipline/program level at each participating institution.

Nationally, undergraduate student enrolment in accredited engineering programs totalled 88,273 in 2019, an increase of 7.0 percent from 2015 and a decrease of 12.0 percent from 2018. Ontario accounts for 45.5 percent of the undergraduate enrolments.

The traditional disciplines of engineering: mechanical, civil, chemical and electrical, have seen steady increases in demand and enrolment. The newer, although now well established, programs such as computer and software engineering have increased at a faster rate and have begun to rival the traditional fields.

According to Engineers Canada, the most popular undergraduate engineering disciplines in 2019 were mechanical engineering, civil engineering, and electrical engineering, representing 21.7 percent, 13.8 percent, and 12.2 percent of total undergraduate enrolment, respectively. Environmental engineering (57.6 per cent), computer engineering (14.5 per cent), and biosystems engineering (13.8 per cent) demonstrated the highest growth since the previous year. Likewise, the disciplines that experienced the largest cumulative growth from 2015 were biosystems engineering (72.9 per cent), software engineering (67.2 per cent), and computer engineering (52.7 per cent).

It is noticeable that among the fastest growing demand from students for engineering programs are those focused on emerging areas of technology, including bioengineering and environmental engineering as well as software and computing. These programs also have the largest discrepancy between applications and enrolment, which is an indicator of under-served demand.

For existing engineering schools, built largely on the traditional disciplines, it can be challenging to expand into emerging fields. New professional programs have much greater freedom from the outset to focus on emerging fields and to address the evident demand from prospective students to study the likes of biological and environmental engineering, and other emerging fields.

There is also a growing demand among undergraduate students to combine engineering with fields such as business management, international development or technology law to develop a generalist perspective alongside their specialist knowledge.

There is an opportunity for Brock University to explore offering engineering education for emerging fields where demand is growing and which are currently underserved by traditional engineering schools. With Brock’s strengths in transdisciplinary collaboration, there is also an opportunity to develop new integrated degrees that enable students to study engineering with other fields (e.g. business management, international development or public policy), without extending the length of their studies or doubling their course load.

In 2015 Engineers Canada published “[Engineering Labour Market in Canada: Projections to 2025](#)”. This report examined the labour market for fourteen engineering occupations in Canada and concluded that “~100,000 new engineers will be needed in the next ten years to replace those who are retiring or to fill new jobs as the economy expands.” The report continues, stating that the country is facing a skills gap as senior engineers retire leaving a workforce that is not necessarily qualified to replace them. To address this gap, new recruits will have to come from engineering’s “underrepresented groups” women and Indigenous Canadians as well as from traditional sources.

### Duplicative Similarities

Provide evidence that any duplicative similarities to existing programs, internally, provincially or nationally, are justifiable for reasons of public funding.

A labour market study by Engineers Canada Labour projects a growing need for engineers to replace retiring engineers, and to support the Canadian economy [1]. Integrated Engineering gives students the broad background necessary to adapt quickly to future engineering trends. In Canada, only two universities currently offer Integrated Engineering undergraduate degrees: University of British Columbia (UBC) and University of Western Ontario (UWO). Similar to theirs, our integrated engineering program is a multidisciplinary engineering program, emphasizing problem-solving, design, and development of learning skills for our students, so they will be well trained for today's and tomorrow's emerging workplace. The success of these two universities on integrated engineering proves that there is demand for Integrated Engineering in the workplace.

At UBC and UWO, the students choose traditional technical electives courses offered by various traditional engineering departments and choose projects unique to Integrated engineering. Our proposed approach to create a dedicated Integrated Engineering program will give us a unique advantage in offering courses of a multidisciplinary nature, in addition to projects, making our program very flexible and adaptable to future engineering trends.

<https://engineerscanada.ca/sites/default/files/Labour-Market-2015-e.pdf>

### Decanal Comments

Include certification from the relevant Dean(s) that the new degree/major is an appropriate and desirable addition to the academic programs of the University and is in line with the strategic direction of the Faculty. As well a clear commitment that the new program will be appropriately resourced. For undergraduate programs, the relevant Dean(s) shall be the Dean(s) of the Faculty within which the program resides. For graduate programs, the appropriate Deans shall be both the Dean of Graduate Studies and the Dean(s) of the relevant Faculty or Faculties.

The FMS Strategic Plan is to strengthen our base of fundamental research and academic excellence, support existing trans- and interdisciplinary research and teaching programs, and launch new innovative programs to take advantage of today's opportunities. Our Strategic Plan is intended to maintain the strength in all traditional disciplines to allow us to grow and enhance programs and research in the following overlapping areas: Sustainability, Software, Mathematics and Statistics, Computation, Engineering and Technology, and Health. Our goal is to be nimble in mounting programs in areas of emerging strategic importance. Thus, the Integrated Engineering undergraduate program is in keeping with our plan. There are natural links between the Engineering faculty and the faculty on other departments in FMS, as evident by the ease in having cross-appointments between Engineering and other FMS departments. The Integrated Engineering program will require students to take foundational courses in Physics, Mathematics and Statistics, Chemistry, and Computer Science, courses that are currently offered in FMS. Additional resources, however, will be required by these departments to accommodate the increased enrolment. Space to accommodate courses in Engineering and the research labs of the Engineering faculty are not available, however, within the current spaces in FMS.

Please see attached letter of support from Dean, Faculty of Mathematics and Science.



February 2, 2022

To whom it May concern,

The **Bachelor of Engineering in Integrated Engineering (B.Eng.)** is an appropriate and desirable addition to the academic programs of the University and is in line with the strategic direction of the Faculty of Math & Science (FMS), as one of the pillars of the strategic plan.

The FMS Strategic Plan is to strengthen our base of fundamental research and academic excellence, support existing trans- and interdisciplinary research and teaching programs, and launch new innovative programs to take advantage of today's opportunities. Our Strategic Plan is intended to maintain the strength in all traditional disciplines to allow us to grow and enhance programs and research in the following overlapping areas: Sustainability, Software, Mathematics and Statistics, Computation, Engineering and Technology, and Health.

Our goal is to be nimble in mounting programs in areas of emerging strategic importance. Thus, the Bachelor of Engineering in Integrated Engineering (B.Eng.) undergraduate program is in keeping with our plan. There are natural links between the Engineering faculty and the faculty on other departments in FMS, as evident by the ease in having cross-appointments between Engineering and other FMS departments. The B.Eng. program will require students to take foundational courses in Physics, Mathematics and Statistics, Chemistry, and Computer Science, courses that are currently offered in FMS. Additional resources, however, will be required by these departments to accommodate the increased enrolment.

I wholeheartedly support this program based on the information provided.

Yours truly

A handwritten signature in black ink, appearing to read "S. Ejaz Ahmed".

Dr. S. Ejaz Ahmed, Ph.D.  
Dean Faculty of Math & Science

*Professor, Department of Mathematics and Statistics  
Fellow, American Statistical Association  
ASEAN Chair Professorship (Thammasat University)  
Technometrics Review Editor  
Associate Editor: SPL, JSCS & other*

## Appendix A: Summary of consultations completed as part of the Senate process for the establishment of a new academic Unit.

	Participants	Date(s)	Comments
<b>Initial Discussion</b>			
	Special Advisor to the President	August 21, 2018	Special Advisor to support introduction of Engineering
<b>Stakeholder Consultation</b>			
	Faculty Level	August 28, 2020	Proposal circulated to faculty, responses from 5 units received: replacement hires, impact on FMS units re costs, growth of programs
	Library	January 29, 2021	M. Robertson response - supportive questions regarding resources,
	ITS	January 18, 2021	D. Cullum - support, funding for tech in labs
	ORS	February 4, 2021	G. Waters support added reference to VPMI, research partnerships and ORS resources.
<b>Faculty Consultation</b>			
	FMS Chairs and Directors meetings	August 28, 2020, Sept 2, 2020, January 29, 2021	faculty hires, resources, space, admin support
<b>Provost Engagement</b>			
	Provost	February 17, 2021	[Provided letter of support]
<b>SALT* Discussion</b>			
		March 2, 2021	Rethink department acronym - DENG to ENGR
<b>PP&amp;BAC</b>			
		March 23, 2021	Discussion and Feedback
<b>IT&amp;I</b>			
		March 30, 2021	Discussion and Feedback
<b>UPC and/or SGSC</b>			
	UPC	April 5, 2021	Recommend establishment of Department of Engineering for Senate approval.
	SGSC	April 6, 2021	Recommend establishment of Department of Engineering for Senate approval.
	Joint UPC and SGSC	April 19, 2021	At the joint meeting each committee passed separate motions supporting establishment of the new department
<b>Senate Approval</b>			
		May 12, 2021	
<b>Board Agreement</b>			