



MEMORANDUM

To: Executive Committee of Faculty Council (February 7, 2018)
Faculty Council (February 27, 2018)

From: Professor Deepa Kundur
Chair, Division of Engineering Science

Date: January 26, 2018

Re: Closure of Engineering Science's Infrastructure Engineering Stream

REPORT CLASSIFICATION

This is a major policy matter that will be considered by the Executive Committee for endorsing and forwarding to Faculty Council for vote as a regular motion (requiring a simple majority of members present and voting to carry).

SUMMARY

It is proposed that admissions to the Infrastructure Engineering stream within the Division of Engineering Science's undergraduate program be suspended effective May 1, 2018 and the stream closed effective June 30, 2022.

The rationale for closing the stream, a description of the impact of the closure on other programs and units, the accommodation of students, faculty and staff, and the consultations that were undertaken, are described in the attached major modification proposal.

MOTION

Subject to approval by the Faculty of the Applied Science & Engineering

THAT admissions to the Infrastructure Engineering stream within the Division Engineering Science's undergraduate program be suspended effective May 1, 2018, with an anticipated full closure of the stream effective June 30, 2022, as described in the major modification proposal.



**Major Modification Proposal: Closure of Specialist or Major
where there is an Existing Specialist or Major**

**Closure of Infrastructure Engineering Stream
in the Division of Engineering Science**

This template has been developed in line with the University of Toronto's Quality Assurance Process.

Proposed Closure:	Stream in Infrastructure Engineering (Engineering Science Program)
Department / Unit:	Division of Engineering Science
Faculty / Academic Division:	Faculty of Applied Science & Engineering
Faculty / Academic Division Contact:	Caroline Ziegler, Faculty Governance & Programs Officer
Department / Unit Contact:	Professor Deepa Kundur, Chair, Division of Engineering Science
Effective Date Program will be Closed to New Admissions:	May 1, 2018
Effective Date of Full Closure of Program: <i>(Date by which students currently in the program will be expected to graduate)</i>	June 30, 2022
Version Date:	January 23, 2018

1 Summary

The Faculty of Applied Science & Engineering proposes to close the Infrastructure Engineering stream¹ within the Division of Engineering Science's undergraduate program, effective June 30, 2022. The Division will continue to offer streams in Aerospace Engineering; Biomedical Systems Engineering; Electrical and Computer Engineering; Energy Systems Engineering; Engineering Mathematics, Statistics and Finance; Engineering Physics; Robotics Engineering; and Machine Intelligence. Students in the Engineering Science program participate in a common foundation curriculum in Years 1 & 2, then choose a stream at the end of the second year for participation in Years 3 & 4. Therefore, by closing the Infrastructure Engineering stream for new admits effective May 1, 2018, students currently enrolled in Years 1 & 2 will still have the opportunity to enroll in the stream. Closing the stream in 2022 will allow students currently in Year 1 to graduate from the stream, even if they participate in the Faculty's Professional Experience Year (PEY) program (effectively extending the program length by one year).

The Infrastructure Engineering stream is largely distinct, and its closure will not impact any other streams or programs within the Faculty of Applied Science & Engineering. Courses that are currently offered to both the Infrastructure stream and other streams in Engineering Science or programs in the Faculty will continue to be offered.

2 Rationale

The Infrastructure Engineering stream in the Engineering Science program was launched in 2001 as a way to address the critical need for experts in the planning, design, construction, operation, management, repair and rehabilitation of our structural and transportation systems. The stream is unique in offering a focus on advanced modelling and optimization tools, along with a deeper understanding of building materials and engineering design to suit the needs and strengths of the Engineering Science student population. The stream has graduated students who have gone on to take leadership roles in engineering firms, government and planning; as well as entrepreneurs and researchers in academia.

Since 2001, the stream has fluctuated in popularity, reaching a class population of up to 23 students. However, in recent years, the interest in the program has been on the decline, with six students selecting the stream in 2016, and only three students selecting the stream in 2017. Students in the Engineering Science program are increasingly gravitating towards other streams, including Electrical and Computer Engineering, and some of the newer stream offerings in the program, such as Engineering Mathematics, Statistics and Finance, and Robotics Engineering, as the demand for engineering professionals in these areas increases significantly.

Although there is still a significant demand for professionals to manage our infrastructure needs, we are proposing to close the stream based on low student demand. It is important to note that the Faculty of Applied Science & Engineering offers a full program in Civil Engineering, and so students entering the Faculty will still have an opportunity to study Infrastructure Engineering, and in fact, course offerings in related areas of study have increased in recent years for students in the Civil Engineering program, specifically in building science and intelligent transportation systems.

¹ Engineering Science streams are referred to within the Faculty as "options", and in the undergraduate calendar and on student transcripts, as "majors".

3 Impact on Other Programs/Units

This proposal was originally brought forward by the Department of Civil Engineering, which runs the Infrastructure Engineering stream in conjunction with the Division of Engineering Science. Although the closure will require the cancellation of five undergraduate courses from the Department of Civil Engineering, the instructors of these courses will be reassigned to teach other courses in the department where there is need (the department is currently employing a number of sessional instructors).

Although the closure will have some impact on the number of graduates available to industry and academia, the Department of Civil Engineering will continue to offer a high quality Civil Engineering program, offering students an opportunity to study infrastructure and the new technologies being deployed to design, build and maintain the built environment.

The cancellation of the stream will narrow the offerings within the Engineering program, eliminating the opportunity for Engineering Science students to participate in a stream oriented towards Civil Engineering and the built environment. However, it should be noted that the Division of Engineering Science also offers a stream in Energy Systems Engineering, which offers some overlap in terms of course offerings and post-graduate opportunities. Also, the Department of Civil Engineering is very interested in working on a new stream in the coming years that will likely focus on Intelligent Transportation Systems or City Systems. This new stream will be developed in consultation with students, industry, staff and faculty to create a program that suits the interests of students and the demands from industry and academia, and will provide opportunities for collaboration with other streams. For example, a stream in Intelligent Transportation Systems would provide excellent opportunities for course collaboration with the recently-approved stream in Machine Intelligence.

As noted, the cancellation of the stream will result in the cancellation of five undergraduate courses offered by the Department of Civil Engineering. It will also result in slightly lower course enrolments in other undergraduate and graduate courses listed in the stream from the Faculty of Applied Science & Engineering, primarily the Department of Civil Engineering, but as stated, recent enrolment in the stream has been small, so this impact will be almost negligible. Any courses in the stream that are offered to other streams and programs will continue to be offered.

4 Accommodation of Students

Table 1: Undergraduate Enrolment

	Year one	Year two	Year three	Year four
Current enrolment	N/A	N/A	3 (PEY: 6)	13

All students currently enrolled in the undergraduate program in Engineering Science will have the opportunity to enroll in the Infrastructure Engineering stream at the beginning of Year 3, and students currently enrolled in the stream will have the opportunity to finish their studies. Students currently in Year 4 will finish the year with no implications or changes to their curriculum. Students currently in Year 3, or participating in their Professional Experience Year, will be impacted only by the cancellation of two core half-courses in engineering design in the fourth year; these students will enroll in the Capstone Design Course for the Civil Engineering program, which will continue to provide the students with an opportunity to engage in a design project related to infrastructure engineering.

Students currently enrolled in Years 1 and 2 of the Engineering Science program who select the stream at the end of Year 2 will participate in a modified curriculum. Like the students currently in Year 3, they will take the Civil Engineering Capstone Design Course with students from the Civil Engineering program when they are in Year 4. Three courses currently offered to the Infrastructure Engineering stream in Year 3 will be cancelled, and these students will be enrolled in similar courses offered to students in the Civil Engineering program. Differences in content have been identified, and students in the Engineering Science program will be offered special seminars to make up for the primary differences. Students will still participate in the Engineering Science Thesis, in a required Option Seminar course, and in the other courses in the stream that are currently shared with the undergraduate and graduate programs in Civil Engineering.

Any students who have not completed the stream by 2022 will still have the opportunity to complete the program, although further minor modifications may need to be made (for example, the special seminars noted above will no longer be offered, and students will be required to participate in the Option Seminar course with another stream in the Engineering Science program), but most of the courses in the stream will remain available as they are also offered to students in the program in Civil Engineering.

5 Consultation

Students currently enrolled in the stream were consulted through a meeting with the chairs of the stream, Professor Matthew Roorda and Professor Evan Bentz. At this meeting, the reasons for the proposed closure were shared, along with the plan for students who select the stream over the next two years. Students who were particularly concerned that their degree may not be as highly valued if the stream is closed were assured that there is still significant demand for their strengths in both industry and academia, and that the program closure is truly a result of a lack of student interest in the current stream curriculum. Also, students currently enrolled in Years 1 and 2, and particularly those interested in the stream, were invited for a Q&A session with Professor Roorda. Based on student surveys and this meeting, we are anticipating that approximately three to five students are considering the stream from the current Year 2 class. As noted, students will also be consulted on the creation of a new stream developed by the Department of Civil Engineering in due course.

If the closure of the Infrastructure Engineering stream is approved, all students in the Engineering Science program will be informed by the chair of the program via email and through the annual program town hall.

6 Accommodation of Faculty/Staff

As noted, five undergraduate courses will be cancelled, however the instructors of these courses will be easily deployed to other teaching opportunities, as the Department of Civil Engineering is already employing a number of sessional instructors (in fact, two of the five courses to be cancelled are currently taught by a sessional instructor). The overall size of the Engineering Science program will not change, and so there will be minimal impact to program staff and faculty otherwise.

7 Governance/Approval Process

STEP	DATE
Division Sign-Off	September 2017

Faculty Curriculum Committee Approval	December 2017
Decanal / Provostial Sign-Off	February 2018
Faculty Council Approval	February 27, 2018
Submission to AP&P for Information	February 2018
Inclusion in Annual Report to Quality Council	Spring 2018