Accredited Engineering Bridging Pathway Development Guidelines

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April 2024

Contents

1 Introduction

This document is intended to provide a high-level overview to pathway developers who are building an accredited engineering transfer pathway. Some elements may not apply to every institution or context, and some things not mentioned may apply. This can be used as a general guideline.

2 Market Research

A market research study can be used to explore the feasibility of building a pathway. This could explore the potential size of the bridging pathway market for your institution, which colleges and engineering disciplines might make the best partners, and what would influence prospective applications to enroll.

Queen's contracted Academica to conduct a market research study. At a high level, this study showed that there was a market to support multiple accredited engineering bridging pathways in Ontario.

This study showed that advanced diploma students are vocationally motivated to seek an accredited engineering degree. These students want to improve their ability to get a job, increase their earning potential, and become eligible for professional engineering licensure (P.Eng.).

A shorter time to completion is the biggest reason for interest in bridging-style transfer pathways, which is intertwined with a wish to have prior learning recognized (through transfer credits). Another consideration is that it saves money – these students are somewhat price sensitive. This highlights the importance of building a time efficient (3 years to complete the advanced diploma plus 2 years to complete degree is the ideal) and well communicated pathway.

Students tend to prefer bridging to an institution close to home, which further supports a network model for engineering transfer, with multiple sending and receiving institutions spread across the province.

2.1 Headcount Data

Headcount data could be used to target areas of high potential student interest to ensure pathways are reaching a high number of students.

Headcount data can be found in Ontario's Data Catalogue, which includes a dataset on the annual enrolment of engineering technology programs broken down by institution and discipline. The current data range (as of 2024) is 2012 – 2022. Search "College enrolment – Dataset" in the Ontario Data Catalogue, currently hosted at: https://data.ontario.ca/dataset/college-enrolment

3 Building Internal Support

New pathways require upfront financial investment to build, as well as the ongoing delivery cost and administrative overhead. In addition, there can be a perception among some faculty that technology courses do not have equivalence to engineering courses, or that college credits cannot be used to meet Canadian Engineering Accreditation Board (CEAB) requirements. Finally, stakeholders can hold negative judgements about a college education, college programs, or college students.

When proposing a pathway, consider what your institution values and how (or if) it aligns with your strategic plan. If it aligns, this is strong motivation to build a pathway because of the improved access to the program for under-represented students.

The pathway could be a net positive financially because it can be used to fill seats in upper years that would otherwise go empty. This may require a short-term loss to offer low-enrollment bridging courses, but this cost may be recouped in later years when students continue into their upper-year courses. The transferability of technology courses for engineering courses is discussed in detail later in Section 4.2 Transfer Credit Assessment and Section 7 Accreditation. Finally, negative judgements about college programs and college students are not well supported. Research repeatedly shows that the grades of transfer students from college are indistinguishable from students coming directly from high school – they neither under- nor over-perform.

For best results, there should be supporters at multiple levels of the institution, including advocates in leadership positions and ideally alignment with a strategic plan. Building internal support is a non-trivial aspect of pathway development.

4 Pathway Design

In Ontario a three-phase transfer pathway framework, intended to be used in traditional undergraduate engineering programs, has been under development since 2015.

Development has spanned four ONCAT projects [1] – [4], 2 studies that conducted additional background research [5], [6], and 2 papers with project summary and updates [7], [8]. There are another 2 papers pending publication, one with further background research and the other with further project updates.

This framework was designed with scalability in mind. The intention is that this framework could work for any accredited engineering institution receiving transfer students from engineering technology programs. Due to program similarities across Canada, this framework could also be applied outside of Ontario.

The early ONCAT projects were focused on feasibility and later projects proposed the three-phase framework and then reported on initial development efforts. First, the level of similarity across the Ontario engineering technology programs and across the Ontario accredited engineering degree programs was explored. Then, overlap between the two sectors was determined to see the typical amount of transfer credit that could be granted. Given the typical amount of eligible transfer credit, and the goal of graduating students within two calendar years while maintaining a reasonable workload (no semester heavier than a “typical” year of engineering study), it was determined that the bridging content was too much to fit into a single summer bridging semester. Therefore, the three-phase transfer was proposed to spread out this workload into the final year of college study.

4.1 Three-Phase Bridging Pathway Framework

Engineering Technology students are typically eligible for slightly more than 1 year worth of transfer credits (~12-15 courses), however these courses come from all 4 year-levels of the degree program. This means there is a need to fill in gaps in first- and second-year prerequisite content to allow students to enter the program at an upper-year level, and that there are gaps in the schedule at the third- and fourth-year level which could be backfilled with any remaining first- and second-year courses.

The three-phase bridging pathway framework involves 3 phases of bridging:

Phase 1: Preparatory Courses. During a student's final year of their engineering technology college program, they take 2-3 fundamental engineering courses asynchronously online.

Phase 2: Summer Bridge. After successful completion of the Preparatory Courses, students will matriculate into the Summer Bridge. This is an in-person full-time summer semester. The six courses are custom designed to fill the curriculum gaps between Ontario engineering technology programs and accredited engineering programs. Generally, there are 5 core courses for all disciplines plus 1 discipline-specific course.

Phase 3: Degree Completion. Students then join their engineering discipline at approximately the 3rd year level and complete all of the remaining degree requirements, while backfilling any remaining first- and second-year courses in the gaps in their schedule.

The exact bridging courses taken in each pathway phase will differ slightly based on the engineering discipline, the sending institution, and the receiving institution.

These online Preparatory Courses represent a low-risk opportunity for students to experience the rigour of engineering courses and the additional workload typically expected of an engineering program without moving cities or paying an entire semester of tuition. It also gives the institution an opportunity to ensure students will succeed in the engineering program because the courses are used as part of the conditional admission requirements and students must meet a minimum grade requirement of 70% in each course to progress to the second bridging phase.

An example curriculum is shown in Table 1.

Table 1: Example bridging courses, with the year-level of the courses shown in parenthesis.

Bridging Phase	Course
1: Preparatory Courses Online asynchronous, concurrent with diploma	Introduction to Linear Algebra
	Physics 1 - Mechanics
2: Summer Bridge In-person	Introductory Chemistry (no high school prerequisite)
	Engineering Design and Practice (first and second year)
	Introduction to Computer Programming
	Calculus II
	Statistics and Differential Equations
	Discipline-specific course (second year)
3: Degree Completion In-person	Students would take primarily third year courses, while backfilling any remaining first- or second-year courses as required – with space available due to upper-year transfer credits.

4.2 Transfer Credit Assessment

The first step towards implementing the three-phase framework is to complete an initial transfer credit assessment between any participating advanced diploma and engineering degree programs. This initial assessment can be done by a staff and later formalized by faculty and subject matter experts (see section 7.1 for a more formal process). The assessment can be done using course syllabi, course and program learning outcomes, and, if needed, evaluation of course materials like final exams. Consider accreditation implications of the proposed transfer credit course list, like AU minimums and the number of courses that must be taught by a licensed instructor.

4.3 Determine Bridging Courses

Overlaying the proposed transfer credits on the full program course list will show the gaps that must be filled with bridging courses. Target offering first- and second-year courses with the longest prerequisite chain that follow them, to help reduce the students' time to completion. This is likely fundamental math and science courses like calculus 2, physics, etc. Consider prerequisite chains, reasonable workloads, and other opportunities for the institution to leverage these bridging courses. For example, an online version of Physics 1 could be offered the semester after the "normal" offering so that direct-entry students who fail the "normal" offering have an opportunity to retake the credit without being delayed by a year.

4.4 Developing New Bridging Courses

New bridging courses may need to be developed to offer a time efficient transfer pathway.

Consider if multiple general courses could be condensed into a single course by removing some content and keeping only the content "must-haves" for a specific subset of engineering disciplines. For example, a general first-year chemistry course could be tailored to the needs to mechanical engineering students knowing that the students taking the course don't need certain content because they aren't going into chemical engineering. This strategy of trimming material could also be used to open up additional course time for content review to ensure all students are up to speed when starting the course.

If typical engineering technology courses only cover a portion of a course's content, a custom bridging course could pick up where the engineering technology course left off to avoid repetition for the student and increase time efficiency by delivering a smaller course.

4.5 Efficiency Opportunities Between Receiving Institutions

Other institutions, including Queen's University, are already offering various online engineering courses and/or bridging courses (Queen's is using this three-phase framework). There may be mutually beneficial offerings that could be coordinated to reduce overlap and reduce costs. A network solution could have multiple institutions each offering a small number of bridging courses that all students are able to take, improving efficiency for the sector and reducing the burden of building and operating a bridging pathway. There are working groups already exploring this.

4.6 Developing Review Content

Certain bridging courses may benefit from a not-for-credit "week zero" content review module. This could be especially useful for bridging courses that follow-on from a course typically granted as a transfer credit. This week zero content could review some fundamentals from the transfer credit course and scaffold into the first few weeks of the bridging course. This can refresh student's memory who took the transfer credit course a few years before, boost knowledge in case any college's course lacked

content, and build student confidence moving into the bridging course. It could also be used to share additional explanation and examples for the most difficult/confusing content in the course as reference material for the students. When building this content, consider if it could benefit direct-entry students taking similar courses as well.

4.7 Determine Admissions Conditions

The three-phase transfer pathway framework is designed such that there are no high school prerequisite course or grade requirements. Only the student's performance during their college courses is assessed in the admission process, to be more accessible for students who need a "fresh start" at college as adults or otherwise were unable to perform in high school at the level required for direct entry into an engineering program. The high school prerequisites are not required because engineering technology programs cover math, physics, and English communication content. Often, chemistry is not covered in the engineering technology program, so the chemistry bridging course was designed to cover the basic high school content. The entire course content can be downloaded for free from the eCampus Ontario Virtual Learning Strategy database under the course code APSC 137 (Introductory Engineering Chemistry for Technology Students).

Queen's has accepted civil engineering technology transfer students for over 2 decades from St. Lawrence College. These students had to graduate from the advanced diploma with a final GPA over 70% and complete two Preparatory Courses with a grade of 70% in each course. Queen's found that students who met this requirement almost always performed well in the engineering degree program. Therefore, these prerequisite requirements stuck when implementing the three-phase transfer framework, with students under these conditions for the duration of their Preparatory Courses and then matriculating into the "normal" engineering degree program at the beginning of the Summer Bridge, where all of the "normal" academic regulations would apply, the same as any direct-entry student.

5 Internal Administrative Processes

Some internal administrative processes may need to be created to facilitate a transfer pathway. Many of these will need to be considered before undertaking the quality assurance activities. Consider if there are any other administrative processes that are not on this list.

5.1 Admission Process

For the admission processes, consider:

- If this will be done through OUAC or if applications go directly to the institution.
- The ideal timing for application window and realistic timelines for processing applications and sending offers.
- Who will review applications and when.
- The admission conditions and if performance on the Preparatory Courses will be a condition.
- If high school course or grade prerequisites are needed (not recommended).
- What program plan and year level the students are initially accepted into. For example, a Non-Degree plan for the Preparatory Courses could be used because students still have admission conditions to fulfill. Non-Degree plans have eligibility implications for financial aid and some student services.

5.2 Matriculation

Matriculating students into new academic plans may be required, if admission conditions are used. Consider who will do this, and when, as well as what academic plans will be used.

5.3 Tuition and Fees

Consider the tuition and fee structure for the bridging courses. Will it follow existing pricing structures? Will any tuition discounts or awards by applied to these students?

5.4 Admission Envelope

Consider how these students may impact your admission envelope and grant funding from the government.

5.5 Course Enrolments

The students will need to be enrolled into their bridging courses. Consider who will do this, and when.

5.6 Applying Transfer Credits

The transfer credits will need to be applied to the student records. Consider:

- Who will do this, and when.
- What information do they need and who will procure it.
- If they need to interface with other units to accomplish this.

5.7 Academic Advising

These students will need various forms of academic advising and support. Consider:

- If new capacity is needed.
- The unique needs transfer students have.
- Advising needs across different semesters.

Additional information about supporting students is discussed in Section 11 Student Support.

6 Quality Assurance

The Ontario Universities Council on Quality Assurance (the "Quality Council") is responsible for quality assurance of all Ontario universities. Their Quality Assurance Guide outlines the quality assurance processes that universities must follow. The Quality Assurance Guide (as of 2024) states:

"The following examples are offered by the Quality Council to illustrate what will normally constitute a 'significant change' and therefore a 'major modification'... New bridging options for college diploma graduates (e.g., 2+2 arrangements)". This means that a new transfer pathway is subject to the institution's program Major Modification quality assurance processes. Check with the quality assurance office for details.

The Quality Council webpage outlines all of the details about program Major Modifications: https://oucqa.ca/wp-content/uploads/2023/12/Guide-to-the-Quality-Assurance-Framework-2021-Revised-Oct-2023.pdf

6.1 Major Program Modification

The exact details of a Major Program Modification would differ between institutions. However, the general process would be similar. The document that outlines the specific institutional process is likely found through the quality assurance office.

Typically, this process involves outlining all aspects of a new program, conducting rounds of consultations, and then seeking formal Senate approval.

All aspects of a new program are outlined, including the nature of the change. In this case, the major change is the implementation of the bridging pathway and likely covers areas such as: modification to admission requirements, new offerings of bridging courses, change to intake numbers, or more. The bridging process can be explained along with an explanation of any modifications that apply. Discuss the rationale for these changes (opening opportunities to a different audience, increasing diversity, increasing enrolment numbers in general, increase enrolment in areas that have capacity, etc.). Include a financial analysis with projected resource needs and income.

The consultation process will likely involve meetings with the Registrar's Office, the Admission's Office, Planning & Budget, Institutional Research & Planning, the participating engineering departments, faculty office stakeholders (academic operations, student services, finance, etc.). They will need to sign the document before proceeding to formal approval. These consultations are an extremely valuable activity because it ensures all of the details are sorted out before implementation, all stakeholders are engaged and supportive. This means that once the Program Major Modification gets sent for formal approval, the supporters are in place to ensure a smooth approval.

The formal approval is done internally, often including approval at Senate. This does not require approval from the Ontario Quality Council, but the institution's Senate verdict is reported to the Ontario Quality Council during the annual report.

This process could take 6 months or more, depending on what preliminary work has been done before consultation meetings begin.

6.2 Budget Forecasting

When building a budget forecast, consider:

- Potential implications to the government program grants.
- Tuition pricing for bridging courses.
- The revenue transfer students represent in their upper year of study, filling additional seats in "existing" course offerings.
- Offering bursaries or scholarships tailored to transfer students.
- Course development costs.
- All costs associated with marketing and recruitment. Printing brochures, building webpages, visiting pathway fairs, etc.
- All costs associated with running bridging courses (administrative, shared services, instructors, TAs, online exam proctoring costs, etc.).

7 Accreditation

All students in a bridging pathway must meet all of the same requirements as direct-entry students. Engineering pathways are not considered a distinct “engineering program”, they are simply an alternative admission method into an existing engineering program. This means that a *pathway* does not “seek accreditation” or “earn accreditation”, it is just a pathway into an already accredited engineering program. However, the pathway does introduce accreditation considerations for the engineering program. Most of these considerations revolve around granting transfer credits, licensed instructors, and Accreditation Unit (AU) minimums.

7.1 Granting Transfer Credits

The CEAB 2023 Accreditation Criteria and Procedures Appendix 1 outlines all of the regulations that must be followed for granting transfer credits. A Standard Operating Procedure (SOP) can be created to outline an internal process for meeting each of these requirements and can be used as evidence during an accreditation visit.

This SOP could contain information on:

1. Pre-approving lists of eligible transfer credits.
2. Monitoring the continued accuracy of the eligible transfer credit list.
3. Continually improving the list of eligible transfer credits.
4. Granting transfer credits to students who have met the eligibility requirements.

A pre-approved list of eligible transfer credits can be purely internal or can be formalized as a transfer credit list in an articulation agreement. The process to develop this list is often managed by a staff pathway coordinator who can liaise with the college, internal department, and Associate Deans as necessary.

An example simplified process for pre-approving a list of eligible transfer credits is:

1. The pathway coordinator can procure course outlines (showing learning outcomes) for relevant college courses, review them, and create an initial transfer credit recommendation. The course outlines and recommendations are sent to a subject matter expert familiar with the course content.
2. The subject matter expert can assess the course description and learning outcomes of the sending institution course(s) and the receiving institution course(s) to determine:
    a. Substantial complexity and content overlap of 70% or more.
    b. Whether the student will have the prerequisite knowledge to progress academically.
3. If necessary, additional information can be requested from the sending intuition, including copies of assessments to determine the difficulty and the degree to which questions in the exam are novel to the students.
4. A holistic assessment of the pre-approved transfer credits can be done to ensure a cohesive package of credits.

Course content overlap can be determined by ensuring that the field of knowledge is covered with similar scope and depth. Complexity overlap can be determined by comparing keywords related to complexity of the learning outcomes. In addition, equal or greater course hours will be ensured. Other elements may be considered such as the course textbooks, year level, or prerequisites.

Transfer credits can be granted for a specific course or as a substitute for a general Technical Elective, Complementary Studies, or Free Elective. Generally, multiple sending institution courses can count towards a single receiving institution course by combining the course hours spent on relevant topics, learning outcomes, etc. and evaluating appropriate equivalencies.

Monitoring for continued accuracy can take the form of semi-regularly procuring course outlines to ensure courses haven't changed substantially year over year.

Continuous improvement can involve tracking student grade data to determine if transfer students' academic progression, graduation rates, graduate attribute indicators, and course grades differ significantly from that of students who went through all four years in the degree program. More specifically, to check if transfer students under or overperform in courses that have a prerequisite that was granted as a transfer credit. In addition, students could be surveyed about the perceived preparedness based on their transfer credits.

Students could earn credits from the pre-approved list if they earn 70% in each of their sending-institution courses that compose the credit. Credits may also be granted on a case-by-case basis, as usual.

7.2 Credit for Engineering Science and Engineering Design

Credit for specified Engineering Science and Engineering Design from technology courses can be challenging. There are logistical challenges with validating the licensure status of instructors at another institution, linking instructors to specific students, and maintaining accuracy over time. It becomes especially challenging for larger colleges who have multiple course sections, instructors, and course offering per year, as well as tracking this across multiple colleges.

There are also challenges with requiring that specific engineering technology courses be taught by a P.Eng. This is not impossible, but some institutions may not be willing or able to commit to this requirement.

Our experience is that all licensed Engineering Science and Engineering Design AUs should be delivered by the receiving institution. This can be accomplished by hiring licensed instructors for bridging courses, careful AU tracking, and strategic hiring decisions. For example, there will likely be a short list of courses (e.g. technical third-year courses that are not granted as transfer credit) that are important to be taught by a P.Eng. Licensed instructors can be allocated to these courses to ensure requirements are easily met by students without resorting to taking additional courses to meet their minimums. Other solutions can also be explored.

7.3 Meeting AU Minimums

All regular CEAB criteria also apply to students in a bridging program and the bridging students must meet all of the same requirements as a direct entry student. This means they must meet all AU minimum through a combination of transfer credits, bridging courses, and courses taken during the remaining years in their degree program.

Tracking these minimums could be done in multiple different ways. One potential solution is to track each student individually to ensure that all of the potential permutations of transfer credits, bridging courses, and upper year courses are captured. This could be done with spreadsheets filled out in collaboration between the student and a pathway coordinator.

7.4 Staffing Considerations

Staffing and other logistical considerations must be made if courses are being run in unusual semesters (like the summer semester). Faculty may be bound by collective agreements which do not allow them to instruct more than 2 semesters in a row, or they may otherwise be unwilling to instruct a course in the summer. Contract (adjunct or graduate student/Teaching Fellow) staff can be used, though there should be plans for ongoing course development. Accreditation considerations should also be made in terms of instructor licensure.

7.5 Notification of Change to CEAB

CEAB must be notified of any addition of a transfer program that has different admission criteria. The 2023 CEAB criteria 4.7 Notification of Significant Program Change states:

"**4.7 Notice of significant program change:** Any significant change that takes place during the term of accreditation of an accredited engineering program must be reported to the Accreditation Board. Any change related to an aspect referred to in the Accreditation Criteria and Procedures and related regulations is a significant change giving rise to the reporting obligations and may necessitate an immediate reassessment…".

Implementing a bridging pathway would relate to at least one aspect outlined in the Accreditation Criteria:

"**3.3.1 Admission:** There must be documented processes and policies for admission of students. Admission involving advanced standing, prior studies, transfer credits and/or exchange studies must be in compliance with the associated Accreditation Board regulations. The document entitled the Process for Pre-Approving Transfer Credits documents this process".

A document should be shared with CEAB that outlines the pathway structure, a description of the changes to the admission policy, and information about the ways the pathway is meeting accreditation criteria. CEAB will review this document at one of their meetings and provide an acceptance or rejection of the change. To clarify, the transfer pathway itself is not an accredited program, it is an alternate entry method into the existing accredited engineering programs. All students coming through this alternate entry method must still meet all CEAB criteria. This notification of change to CEAB is not an accreditation decision – it is just an acceptance of the change to the program. The engineering program accreditation decision would occur during the next regularly scheduled accreditation visit.

8 Building Relationships with Sending Institutions

Transfer pathways work best when there is a partnership between the sending and the receiving institution. Pathways, especially formalized pathways, are a selling feature that colleges can use to recruit students into their programs. This means that colleges are generally receptive to collaboration and assisting with pathway development and promotion.

Typically, a college will have a Pathways Office or a Pathways Coordinator who can be the staff point person at the institution. It is also helpful to have an academic contact (professor, program coordinator, or department head) within the partnering college engineering technology discipline. These partners can support the transfer credit assessment process by sharing documents (course outlines), data, and answering follow-up questions. Academic contacts can be strong advocates for the program and can

share more information with students who express interest in transferring into an engineering program. The staff pathways office contact can engage on an institutional level to coordinate student articles, marketing, classroom visits, pathways fairs, and more.

ONCAT is another valuable resource for building relationships. They have monthly “lunch and learn” sessions, a (semi) annual conference, and other events. Their staff are also very knowledgeable and well connected and can be a valuable resource. There are many institutions with well-developed internal processes related to transfer, and learning from these leaders will increase the efficiency of development.

9 Articulation Agreements

Articulation agreements are a way to formalize relationships, transfer credit packages, and transfer pathways. There are some colleges who will not participate in any marketing or collaborative efforts until an agreement has been signed. Formalizing agreements is also a way to provide students with detailed information about exactly what transfer credits they are eligible for, the bridging process they must follow, and the requirements they must meet. This clear communication is deeply valued by students, partly because the standard of service is often low in this area, and partly because these students are making a huge decision to turn down posts-graduation job offers to pursue further education.

The ONTransfer.ca database can be used to post individual transfer credits and full pathways. This way, students can be fully informed about all of their options when looking into transfer pathways. In addition, staff can use the database to inform their credit-granting decisions by checking to see what other institutions are granting for credit.

9.1 MOU Draft

An MOU can be drafted and signed as a way to quickly agree to collaboratively support the development and marketing of a pathway, while working on a full articulation agreement. This is not a required step but could be useful in certain situations when you need to create a semi-formal understanding, move quickly, and build relationships. It could be signed by the Department Head plus the Engineering Dean.

An MOU draft is attached which can be tailored for your specific context.

9.2 Articulation Agreement Draft

An articulation agreement is the final formal agreement for a transfer pathway relationship. It is a legal document that outlines each institution’s rights and responsibilities. It outlines the bridging process with precision and shows the eligible transfer credits and Accreditation Units that can be granted. This would typically require review from all levels of your Faculty of Engineering, institutional legal review, and signature from the Engineering Dean and Provost (or similar figures).

The timelines on developing and signing formal agreements can vary wildly between institutions, between 4 months for experienced institutions to multiple years for others.

An articulation agreement draft is attached. Consider how you could tailor this template to your specific context.

10 Operating the Pathway

There are many steps to operate a pathway, but they are essentially the same as operating any other semester of study. The major differences revolve around offering courses in unusual semesters (if applicable) and tailoring activities for the needs of transfer students.

10.1 Hiring a Pathway Coordinator

Developing and then operating a transfer pathway takes a significant amount of work. Consider if a pathway coordinator can be hired to manage development and operations, perhaps 0.5 – 1.0 FTE, depending on the scope of the project.

10.2 Hiring Bridging Course Instructors

If new bridging courses are to be run, instructors must be hired to teach them. Ideally, consider the types of instructors who would be the be the best fit for teaching this type of student and how the instructors could work together to create a positive and manageable bridging experience. All existing hiring practices can be used.

There may be additional nuances if courses are to be offered in a summer semester where courses are not normally offered. Faculty may be bound by collective agreements which do not allow them to instruct more than 2 semesters in a row, or they may otherwise be unwilling to instruct a course in the summer. Contract (adjunct or graduate student/Teaching Fellow) staff can be used instead, but HR considerations around rights of reappointments, etc. must be made.

Consider if there is budget to hire a student tutor for a small number of hours each week to increase the number of synchronous touchpoints for students taking online asynchronous courses so it is more likely the scheduled times will work for more students.

10.3 Setting up Courses

The normal processes for setting up courses can be used. This can include things like setting up the course page in the online learning platform, timetabling the courses and securing rooms, scheduling final exams, organizing student accommodations, enrolling students in the courses.

Since the bridging courses are being offered to a fewer number of students, there are great opportunities for collaboration amongst instructors to cross-pollinate course content, spread out course deadlines and midterms, and test out new ideas.

10.4 Welcoming Students

Some though can be put into welcome the students into the Preparatory Courses and then to campus once they begin in-person study. Ideally, this should be tailored to transfer students with the understanding that they are new students, despite entering the program at an upper-year level.

11 Student Support

There are many effective strategies for supporting college transfer students entering an accredited engineering program through a transfer pathway. This should be a high area of focus when developing a new transfer pathway. The success of transfer students can be improved by identifying and addressing their specific needs, which can be different compared to direct-entry students, necessitating tailored transfer-specific support.

Students must be engaged in supports early and proactively while trust and credibility are built. Using an "*opt-out of supports*" approach can help normalize seeking help and increase utilization. In addition, collaboration with sending institutions is crucial for a seamless transfer process.

Best practices encompass five key areas of support:

1. Administrative
    a. Leverage a dedicated staff position to coordinate supports, advise students, and assist students in navigating complex transfer processes and policies.
    b. Sign articulation agreements to formalize credit transfer information and empower college partners to provide accurate guidance to students. Share the transfer credit information with the students.
2. Financial
    a. Create transfer-specific tuition discounts, needs-based bursaries, and scholarships.
3. Academic
    a. Create not-for-credit supplementary review material as a resource to ensure students are prepared and confident when starting degree-level courses.
    b. Hire a pathway tutor to provide flexible synchronous academic support to accommodate students with different availabilities.
    c. Support the creation of a peer study group.
    d. Provide resources and workshops to prepare students for academic expectations of university.
4. Social Belonging
    a. Tailor orientation activities for transfer students.
    b. Create a private online social group (Instagram, Discord, Teams, etc) for transfer students, especially when students are taking courses remotely.
    c. Support connections with peer mentors and other direct-entry peers.
5. Professional Development
    a. Create opportunities to engage with professors.
    b. Tailor career development supports and opportunities to transfer students.

For the full report, see the Best Practices for Engineering Transfer Student Support Final Report attached.

12 Continuous Improvement

It is important to notice areas for refinement, seek feedback, analyze data, and then act upon the observations and findings to drive year-over-year improvements. Typically, there are existing institutional processes like, cyclical program review, engineering accreditation visits, etc. However, they may not be fully focused on transfer pathways. So, a more focused approach should be considered to specifically guide transfer pathway improvement.

Program evaluation can be used to systematically define and measure program success, determine effectiveness, and generate findings that can be used for continuous improvement. An institution can use a program evaluation to measure if a transfer pathway is meeting the institution's goals and to provide data that can guide data-driven year-over-year improvements.

One possible methodology that can be used to develop an evaluation plan for a transfer pathway is a generic model adapted from the Evaluation Capacity Network. This model involves 9 iterative steps:

1. Describe the context of the program.
2. Describe the purpose of the evaluation.
3. Determine the evaluation questions (similar to research questions).
4. List the stakeholders.
5. Map the stakeholders to determine who has a stake in the results and needs to be consulted.
6. Build a logic model to show how inputs/resources map to activities which map to outputs/outcomes/program goals.
7. Select your evaluation design.
8. Determine your data collection methods.
9. Create dissemination plan to ensure utilization of the data.

The program evaluation plan could focus on measuring data that is most important to institutional stakeholders. It could collect data at intake, after each phase of bridging, and at graduation (or withdrawal) from the program. It could take the form of student surveys or focus groups, interpretation of internal data sources (grades, transcripts, etc), and/or staff debrief meetings.

For the full program evaluation report, including example surveys, see the Program Evaluation Plan attached. Consider if surveys or semi-structured focus groups will be more suitable in your context.

13 Marketing & Recruitment

Once a pathway is developed, people need to learn about it. This can be done with marketing efforts to spread awareness and target recruitment efforts designed to increase interest and drive applications. Positive marketing stories about the engineering department can also be an attractive fringe benefit in the eyes of certain stakeholders.

13.1 Marketing

There are many approaches to marketing a pathway to spread awareness and build positive sentiment. These strategies are specific to the institution, but the central theme of content tailored to pathway students, and providing useful information to help students make an informed decision applies.

13.2 Student Recruitment

Recruiting students can take many forms. Again, the exact strategies are specific to the institution. One useful principles is the importance of building strong relationships with partnering technology programs.

13.3 Student Retention

Some thought should be put into making the pathway a positive and achievable experience that students want to finish. Thoughtfully consider ways to maintain a reasonable workload and stay engaged with students to keep on top of concerns.

14 Conclusion

In conclusion, building a transfer pathway is a comprehensive process that likely takes multiple years. However, there is an established process that can be used to develop and implement a new pathway, which simplifies the process and ensures accreditation criteria are met.

References:

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