TO: Mike Mahon
President and Vice Chancellor

DATE: January 22, 2014

FROM: Robert A. Boudreau
Chair, Academic Quality Assurance Committee

RE: Engineering Pre-Professional Transfer Program, Academic Quality Assurance Review

In accordance with the U of L *Academic Quality Assurance Policy and Process*, the Academic Quality Assurance Committee approved the review of the Engineering Pre-Professional Transfer Program at its December 19, 2013 meeting.

The Program Review Committee for this review was comprised of David Siminovitch (Program Review Coordinator), Behnam Seyed-Mahmoud, and Hadi Kharaghani. The review produced four documents:[1]

1. *Self-Study Report: Engineering Pre-Professional Transfer Program* (received September 18, 2013) – Self Study Report, developed by the Engineering Pre-Professional Transfer Program Self Study Committee.
2. *University of Lethbridge Engineering Pre-Professional Transfer Program External Review* (received December 13, 2013) – External Review Report by Normand Fortier (Thompson Rivers University) and Aaron Phoenix (University of Saskatchewan) based on their site visit of October 21-22, 2013.
3. Program Response (received December 15, 2013) – response of the Self Study Committee to the external review.
4. *Dean's Response to the Quality Assurance Review of the Engineering Pre-Professional Transfer Program* (received December 17, 2013) – response to the review, written by Craig Cooper, Dean of the Faculty of Arts and Science.

[1] All documents are available upon request.

Self Study

The Self Study Report first summarized some of the three-decade history of the program. In the beginning of the Engineering Pre-Professional Transfer Program (EPPTP), the Physics and Mathematics departments offered the introductory courses in their respective disciplines, and sessional instructors taught the engineering physics courses. In the 1980s, a physics professor taught the engineering courses until his retirement in 1990. After their retirement, the Physics department could not attract faculty to teach the engineering courses. This resulted in a decline in enrolment and concerns from the U of A and U of C about the quality of engineering instruction U of L transfer students were receiving.

The 1999 hiring of a geophysicist revitalized the program. Enrolment increased from 17 students in 1999 to almost 40 in 2002. At this time, however, the transfer arrangement with the U of C was discontinued, which caused enrolment to drop again. Enrolment leveled at about 25 students, until the U of A Faculty of Engineering imposed a GPA reduction on U of L transfer students. This has had an ongoing negative impact on enrolment in the program, which was put on temporary hiatus in spring 2013.

The report discusses several issues related to the U of A's GPA reduction for the EPPTP:

- There were substantive differences between transfer courses at the U of L and the corresponding courses at the U of A.
- The style of instruction varies between the two institutions.
- Only two of the required transfer courses are engineering courses, with the remainder designed for general science students.
- U of A students who transfer from sciences to engineering also received a GPA reduction.
- High school grade admission requirements for the EPPTP program is close to 70% while at the U of A it is over 80%.

The Self Study Report concluded that the GPA reduction at the U of A is largely justifiable. The body of the report noted some of the strengths of the program:

- EPPTP students have a beneficial impact on the academic activity of science students and faculty, as they are generally more academically capable students.
- Graduates who practice engineering in southern Alberta contribute to the diversification of the regional economy.
- EPPTP students have been successful in gaining admission to and graduating from the U of A Engineering program. Since 1995, 143 students were admitted to the U of A. 99 of these graduated, 18 are currently registered, and 26 are no longer in Engineering. The program's admission record is the best of all transfer programs in Alberta.
- The U of L is the only CARI with an Engineering transfer agreement with the U of A.

One weakness noted in the body of the report was that the program is not promoted widely and appears to be not well known in the southern Alberta engineering community.

The report concluded that, as a comprehensive university, the U of L should have pre-professional transfer programs in areas in which it does not offer undergraduate degrees. Changes in programming at other Alberta post-secondary institutions give the EPPTP a significant opportunity to fill the gap.

The Self Study Report listed five main recommendations:

- Ensure transfer courses are compatible with the destination programs.
- Increase the number of courses designated as engineering courses from the two currently to nine.
- Promote the program to the local community.
- Gradually increase the high school GPA entrance requirement.
- Reinstate the program as soon as possible.

External Review

In summary, the External Review Report recommended continuing the EPPTP as it aligns with U of L strategic directions, helps meet an educational need in southern Alberta, and helps meet provincial demand for engineering graduates.

In the Overview section, the External Review Report listed five key recommendations for improving the EPPTP if it restarts:

1. Hire more professional engineers to deliver the required engineering science content. In doing this, first consult with the Faculty of Engineering at the U of A and U of C on the use of professional engineers in their programs.
2. Develop new courses to more closely align the program with the engineering programs at the U of A and U of C and to better engage local engineering professionals.
3. Form an interdisciplinary curriculum committee to oversee the program and ensure it meets the requirements of the engineering programs into which it feeds. This committee should include representatives from the departments of: Physics and Astronomy; Mathematics and Computer Science; and Chemistry and Biochemistry.
4. Where possible, develop engineering-specific mathematics courses.
5. Map program courses to the 12 graduate attributes from the Canadian Engineering Accreditation Board (CEAB) and measure student outcomes against these attributes.

There were several recommendations for improving the program that were noted in the body of the External Review Report:

- Develop a form of streaming for delivery calculus courses, including a stream that targets EPPTP students. As an alternative, weekly calculus seminars for engineering students could be developed.
- Consider developing a transfer to the U of C engineering program. This would require three new courses and enhancing calculus courses.
- Consider giving teaching release time for the coordinator of the program.
- Re-establish the transfer agreements with the U of A and U of C, and explore transfer agreements with institutions outside Alberta.
- Actively promote the program in southern Alberta. Make the program more visible on the U of L website, in the Calendar, and on the appropriate Departmental web pages.
- Ensure academic advisors are aware of the program and are able to give advice on program requirements and transfer agreements.

- Develop an "Introduction to the Engineering Profession" course as a pass/fail seminar course.

The body of the External Review Report noted the strengths of the program:

- The program supports the U of L's Mandate and Strategic Plan.
- Through this program, the U of L can engage local chapters of APEGA (Association of Professional Engineers and Geoscientists of Alberta) and local industry.
- For other postsecondary institutions the program creates another input stream into the second year of their engineering programs.
- The program offers an important alternate path for those students who want to study engineering but are not ready to attend larger universities.
- The courses and content of the program align well with those of the first year U of A engineering program.
- Graduates are accepted into the second year of engineering at the U of A in greater proportion than the provincial average, and their graduation rates from the U of A are comparable nationally.
- Graduates have spoken very positively about the quality of instruction, availability of the instructors, and the small class sizes.

The report identified several issues or challenges for the program:

- Compared to the first year of the U of A's Engineering program, the EPPTP is missing two "Orientation to the Engineering Profession" courses.
- Graduates are not sufficiently prepared in calculus, which is likely because the program's calculus courses are taught at too low a level.
- No EPPTP courses are currently taught by instructors who are licensed to practice engineering.
- The 2002 decision to discontinue transferring students from the EPPTP to the U of C will likely hurt future enrolments in the program.
- The U of A's decision to impose a GPA adjustment to students transferring there from the EPPTP has likely contributed to a decline in enrolment.
- There has been a steep decline in enrolment in the last two years.

Program Response

The Program Response agreed with the External Reviewers' recommendation to restart the EPPTP, and accepted all the recommendations for improving the program when it restarts. The report commented on two of these recommendations:

- **Form an interdisciplinary curriculum committee** - Creating this committee should be a priority, and this group should lead the relaunch of the program. Membership should consist of: Faculty of Arts and Science members with P.Eng. or P.Geo. designations; representatives from the Department of Mathematics and Computer Science; and representatives from the Department of Chemistry and Biochemistry.
- **Develop an "Introduction to the Engineering Profession" course** - The Self Study Committee strongly agrees with this recommendation, and there are local members of APEGA who would be glad to contribute to this course.

The Program Response noted three corrections and additions to the External Review Report:

- The External Review Report said that there was no course equivalency at the U of L for the U of C's PHYS 259 - Electricity and Magnetism. In fact, the U of L equivalent is PHYS 2000. This means that only two new courses would be needed to begin a transfer arrangement with the U of C Engineering program.
- The report claimed a lack of interaction with "the local community, and the surrounding high schools," but the EPPTP has had consistent interactions with the U of A on the transfer arrangement.
- Of the courses listed as needing to be taught by an engineer, only one (ENGG 2000) is of this category. The Faculty of Arts and Science has two faculty members with a P.Eng. designation who could teach this course or help in its design.

Dean's Response

The Dean's Response contained the following recommendations for the EPPTP:

- Establish a EPPTP Curriculum Committee to champion the program, review the program, and recommend program changes needed to align with the U of A and U of C engineering programs and with the CEAB graduate attributes. Complete the curriculum changes before relaunching the program.
- Make an investment of resources in the program. One to two individuals with a P.Eng. designation are needed to run the program. A request for additional resources is currently with the Government of Alberta.
- Re-establish transfer agreements with the U of A and U of C.
- Six months before relaunch, advertise and promote the program heavily. Engage with local representatives of APEGA to promote the EPPTP.

The Academic Quality Assurance Committee is satisfied that the Engineering Pre-Professional Transfer Program academic quality assurance review has followed the U of L's academic quality assurance process appropriately, and acknowledges the successful completion of the review.

Sincerely,

ORIGINAL SIGNED BY:

Robert A. Boudreau

Chair, Academic Quality Assurance Committee

Cc: Andrew Hakin, Provost and Vice President (Academic)