

Cyclical Program Review of Academic Programs offered by the Department of Mining Engineering Progress Report on Implementation Plan: 4-year

Date: 2/17/2022

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Programs	Degrees
Mining Engineering	BASc, MASc, MEng, PhD
Mining Engineering Technology	CMT, BTech
Graduate Diploma in Community Relations for the Extractive Industries	GDip

Table 1 Add/delete rows as required

At the conclusion of the cyclical program review, a final assessment report and implementation plan was agreed by the Teaching and Learning Office and the Deans of the Faculty of Engineering and Applied Science and the School of Graduate Studies. These deans are responsible for monitoring the implementation plan. This report is an important step in the overall cycle of continuous improvement and is an opportunity to reflect on, and document, the progress made on incremental improvements to address recommendations in the implementation plan.

Please complete the table below to report on progress made in the past 4 Years against the implementation plan. Add further explanation, if necessary, in the *additional notes* section.

Please complete this report and return it to guqap@queensu.ca by 2/25/2022. The Teaching and Learning Office will review this progress report. It will then be appended to the Deans' annual reports for the 2021-22 academic year, filed in the Office of the Provost and Vice-Principal (Academic). Please note that monitoring reports will be posted on the University web site.

JORJYC

Signature of Unit Head

March 9, 2022

Date

Kim Pelletier

Signature of Faculty Dean

March 9, 2022

Date

Fabian

Signature of Dean (SGS)

March 10, 2022

Date

K Kolowitz

Signature of Associate Vice-Principal (Teaching and Learning)

March 25, 2022

Date

<p>Recommendation 1: The Reviewers recommend that the unit increase the mining engineering presence in 1st year engineering. In particular, co-teach APSC 151 with the Geology department. Also, the unit acknowledges that APSC 151 was recently split into “biology” and “geology” modules, but also noted that the biology module is being taught by geology.</p>	
<p>Proposed follow-up</p>	<p>Review course content of APSC 151</p>
<p>Responsibility for leading follow-up</p>	<p>Department Head</p>
<p>Timeline for addressing recommendation</p>	<p>By February 2019</p>
<p>Are there additional deliverables associated with the proposed follow-up?</p>	<p>No</p>
<p>Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate ‘N/A’)</p>	
<p>What is the current status of the follow-up?</p>	<p>Completed</p>
<p>Include a completion percentage</p>	<p>100%</p>
<p>Please provide a brief description of the current, completed or planned work</p>	<p>Since September 2019, APSC 151 has been offered jointly between the Departments of Geology and Geological Engineering, and Mining Engineering. Mining teaches 3 weeks of this course (25% of course content). Following a review by the FEAS Curriculum committee, the biology module was removed to allow for the increased Mining content. Topics covered in Mining’s content include the Minerals and Metals Cycle, the project cycle for Mineral Extraction, the UN Sustainable Development Goals, the</p>

	triple bottom line (People-Planet-Profit), Risk Analysis, social license to operation, and community engagement including Indigenous perspectives.
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Recommendation 2: Reviewers recommend the unit increase the undergraduate enrolment. This includes: 1) targeting 35 to 40 students in 2nd year, 2) increasing presence in 1st year (see recommendation #1 above), 3) updating and revitalizing the curriculum.	
Proposed follow-up	Implement a strategic plan to revitalize the curriculum. Consult with the Centre for Teaching and Learning. In order to introduce mining to first-year students, continue to supervise APSC 100 projects and teach part of APSC 151
Responsibility for leading follow-up	Department Head
Timeline for addressing recommendation	Revitalizing the curriculum by the end of 2018-2019 academic year. Mentoring first-year students ongoing
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	
What is the current status of the follow-up?	In process
Include a completion percentage	>75%

<p>Please provide a brief description of the current, completed or planned work</p>	<p>The Department has an increased presence in 1st Year, by teaching 25% of APSC 151 and by offering APSC 143 (Introduction to Programming) by one of our faculty members. In 2022 APSC 143 is offered jointly with Electrical and Computing Engineering (ECE), shared 50/50. In addition to these, we continue involvement in APSC 100.</p> <p>This has significantly increased the exposure of 1st Year students to mining. However, the enrollment suffers from external factors out of the control of the Department, such as cyclical commodity prices (in particular a downturn of the industry in 2017). Our current enrollment is 33 students in 2nd year, 35 in 3rd year and 39 in 4th year.</p> <p>In 2018 a strategic visioning exercise was done by the Department, which led to the document “Towards a strategic plan – A discussion aimed at renewal, continuous learning, and improvement”. In this document, the strategic directions for the Department development were set. These included an update and revitalization of the curriculum, which has been implemented in phases. We already added new courses on Data Science and in Sustainability (Life Cycle Assessment) and are preparing a major curriculum change that will be filed in the next cycle. This will make the curriculum more attractive to 1st year students.</p>
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<p>Recommendation 3: Reviewers recommend that the unit increase postgraduate enrolment, targeting 50 students by: 1) hiring new faculty which will therefore increase postgraduate course offerings. Faculty should talk about their research in undergraduate lectures. 2) Encourage cross appointments with GEO/CHEM/ECE/MECH to increase applicant pool. 3) Acknowledge that students reluctant to enroll in mining, would rather stay in their home department.</p>	
<p>Proposed follow-up</p>	<p>In order to increase the research profile of the department continue cross-appointments with new faculty hires. In conjunction with the Dean’s Office, explore opportunities to increase linkages with industry and the private sector. Formally recognize supervisors supporting students.</p>
<p>Responsibility for leading follow-up</p>	<p>Department Head and Associate Dean FEAS</p>

Timeline for addressing recommendation	Ongoing
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	
What is the current status of the follow-up?	Completed
Include a completion percentage	100%
Please provide a brief description of the current, completed or planned work	<p>In the last few years, several new hires have increased the breadth of research and the research productivity.</p> <p>The new hires develop their research in innovative areas such as:</p> <ol style="list-style-type: none"> (1) Data analytics in mineral processing; (2) Data science, robotics, automation and optimization; and (3) Life cycle assessment and climate change. <p>As a consequence, the number of graduate students is currently at 51 (32 Masters and 19 PhDs).</p> <p>In addition to these hires, we are opening additional positions due to retirements and the opportunity to have a CRC position in the Department:</p> <ul style="list-style-type: none"> • Critical metals: a CRC Tier 2 search is progressing for the area of metal extraction of critical elements. The position is open to candidates that self identify as women.

	<ul style="list-style-type: none"> Energy efficiency: a position on energy efficient mining will be open to replace the retirement of a faculty member that was focus on ventilation and underground mining.
Recommendation 4: Reviewers recommend that the unit increase cooperation with the Department of Geology at the undergraduate level.	
Proposed follow-up	Initiate discussions between the two units. Foster positive relations between the two departments
Responsibility for leading follow-up	Department Head
Timeline for addressing recommendation	Ongoing
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	
What is the current status of the follow-up?	In process
Include a completion percentage	>50%
Please provide a brief description of the current, completed or planned work	Ongoing conversations with the Department of Geological Sciences and Geological Engineering have led to research collaboration (co supervision of graduate students), to joint teaching of APSC 151, and review of course content in GEOE 262.

Recommendation 5: Reviewers recommend that the unit consider student feedback on the undergraduate curriculum. This includes having more labs, discouraging 70% final exams, having a design course in 3rd year, expanding and/or reducing some courses, and having only one capstone course instead of two.	
Proposed follow-up	Continue curriculum review of all undergraduate courses under the guidance of the Centre for Teaching and Learning
Responsibility for leading follow-up	Department Head
Timeline for addressing recommendation	By October 2019
Are there additional deliverables associated with the proposed follow-up?	Choose an item.
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	
What is the current status of the follow-up?	Completed
Include a completion percentage	100%

Please provide a brief description of the current, completed or planned work	Student feedback is systematically reviewed in the Department. The Department has emphasized the recommendation to lower the weight of the final exam and increase the weight of other activities, such as labs, seminars, assignments and quizzes. Currently, no mining course has an exam weighted over 50%.
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Recommendation 6: Reviewers recommend that the unit continue to work on the “Towards a Strategic Plan” initiative. Although all faculty support change, it is a worthwhile target to consider a new undergraduate curriculum in 2020/2021 (with a submission due Oct 2019).	
Proposed follow-up	Finalize “Towards a Strategic Plan” initiative
Responsibility for leading follow-up	Department Head
Timeline for addressing recommendation	By October 2018
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate ‘N/A’)	
What is the current status of the follow-up?	Completed
Include a completion percentage	100%

<p>Please provide a brief description of the current, completed or planned work</p>	<p>The strategic visioning was completed in 2018, and the stages for curriculum renewal have been followed by first incorporating new courses to expand the scope of the curriculum (in 2019 and 2020), and a major curriculum change is prepared for the next cycle (2023).</p> <p>It should also be noticed that the strategic vision was used to determine hiring priorities, which led to positions in:</p> <ul style="list-style-type: none"> • Data analytics: Prof. Charlotte Gibson was hired in 2019 in the area of data analytics in mineral processing. • Intelligent mining systems: Prof. Asli Sari was hired in 2019 in the area of intelligent mining systems, including AI and robotics. • Green mining: Prof. Qian Zhang was hired in 2020 in the area of green mining, life cycle assessment and climate change. • Mine design: Prof. Abbas Taheri was hired in 2021 as Chair In Mine Design (replacing the previous faculty member, who retired), to work in rock mechanics. <p>Currently, we are opening two positions:</p> <ul style="list-style-type: none"> • Critical metals: a CRC Tier 2 search is ongoing for the area of metal extraction of critical elements. The position is open to candidates that self identify as women. • Energy efficiency: a position on energy efficient mining will be open to replace the retirement of a faculty member that was focus on ventilation and underground mining.
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<p>Recommendation 7: Reviewers recommend that the unit take actions to maintain a high female/male undergraduate student ratio. To do so, the unit could: 1) promote hydrometallurgy as “chemical” 2) hire a female faculty member. *part 1 of the recommendation is not supported by the Provost and Vice-Principal (Academic)</p>	
<p>Proposed follow-up</p>	<p>Continue to work with the Equity Office on establishing best practices that will attract more female faculty to the department and assist with reaching equity goals</p>

Responsibility for leading follow-up	Department Head, hiring committees and equity office
Timeline for addressing recommendation	Ongoing
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	
What is the current status of the follow-up?	Completed
Include a completion percentage	100%
Please provide a brief description of the current, completed or planned work	<p>The Department has made significant efforts to increase the female enrollment both among students and faculty members. This is confirmed with the hiring of two female faculty members in 2019 as well as with the position for a CRC Tier 2 in Critical Metals, which is open to candidates that self-identify as women. This position should be filled in 2022.</p> <p>The new hires have helped project a different image of Mining Engineering. Prof. Gibson teaches in the first year APSC 151 course and Prof. Sari APSC 143. We have also encouraged the interest of undergraduate female students, during our Discipline nights, by inviting a diverse pool of speakers.</p>

Recommendation 8: Reviewers recommend that the unit resurrect GCCR (i.e. social performance management in the extractive industries) by: 1) reducing tuition per course, 2) improving online content to that seen with BTech, and 3) making elements available to the undergraduates (social responsibility, community relations).	
Proposed follow-up	Improve the content of the graduate diploma by implementing best practices from the Btech program. Extend some academic content to undergraduates
Responsibility for leading follow-up	Department Head
Timeline for addressing recommendation	By May 2019
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	
What is the current status of the follow-up?	In process
Include a completion percentage	>75%
Please provide a brief description of the current, completed or planned work	The program now called Social Performance Management in the Extractive Industries (SPMEI) has been updated and the fees have been reduced in 2021 to attract more interest. However, the program has not yet attracted a large number of students.

	<p>Students are exposed to these contents in many of our courses in the undergraduate curriculum. These learning outcomes are also monitored by the Engineering Teaching and Learning team, to ensure these are adequately covered in the undergraduate curriculum.</p> <p>It should be noted that undergraduate students take the course MINE 422 Mining Sustainability, which explicitly covers this content.</p>
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<p>Recommendation 9: Reviewers recommend that the unit avoid presenting mining as a “terminal” degree and promote it as one of ten excellent Queen’s engineering programs, but one that offers an incredible experience and exposure to a high-tech field.</p>	
<p>Proposed follow-up</p>	<p>Introduce a combined BSc/MSc program. Raise awareness of graduate degree options by inviting high-profile speakers from industry and research organizations to present their research. Strategically increase the faculty complement</p>
<p>Responsibility for leading follow-up</p>	<p>Department Head</p>
<p>Timeline for addressing recommendation</p>	<p>Ongoing</p>
<p>Are there additional deliverables associated with the proposed follow-up?</p>	<p>No</p>
<p>Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate ‘N/A’)</p>	

What is the current status of the follow-up?	Completed
Include a completion percentage	100%
Please provide a brief description of the current, completed or planned work	<p>The Department has emphasized the breadth of career options that a mining degree offers during Discipline night and in all activities where we can interact with undergraduate students.</p> <p>The new hires in the Department, have increased the gender diversity as well as the research topics covered by Faculty members, including topics that resonate with students, such as technology, digital transformation, environmental and social sustainability, among others.</p> <p>The Department constantly invites high profile speakers to present and talk about relevant topics with our undergraduate and graduate students.</p>

Additional Notes:

Please note any additional issues affecting progress, if applicable.