**Program Review Self Study Template**

| **Program Coordinator:** | | **Brian Gerry** | **School:** | **SENRS** |
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| **Program Code:** | | **ERT** | **Date Completed:** | **Jan. 2017 ERT Program Review and Map** |
| **Program Name:** | | **Earth Resources Technician Co-op** | | |
| **Indicator**  **1.0 Industry Trends** | | **Summary of Key Findings** | |
| **Sectorial Standards and Industry Trends**  **Review / discuss:**   * New or emergent industry / sector themes or issues that may have a potential impact on program positioning * Industry / sector issues identified by the Program Advisory Committee * Recent labor market data or sector reports * Recent or anticipated changes in occupational standards, level of entry and credential and / or standards of accreditation * Program alignment to labor market and sectorial trends * Trends identified by the Program Advisory Committee | | INTRODUCTION:  This program prepares some to continue studies in University degree programs and most students to directly enter the applied geology workplace.  The mix of applicants is about ¾ from Canadian secondary school, and ¼ as persons with related and unrelated degrees from university, from both Canada and abroad. The industry continues to have a very high degree of graduate acceptance and a broadly based positive reception to students seeking co-op work during the program; as evidenced by hiring and requests for applicants that has occurred.  The program has made some adjustments in 2016, based upon Program Advisory Committee direction and agreed to by managers, to curriculum. The goals were to make the curriculum delivery and assessments less complex and thereby , to optimize student learning. These course changes will be first in effect the winter of 2017. It is thought these steps will position the program to function with little additional curriculum adjustment on the near term (unless the College changes staffing).  2016 marked the third year that a Fleming student competed successfully with University students for a high profile, two week training program offered by the Prospectors and Developers Association. This illustrates that the blend of geology and supporting curriculum used at Fleming is functional and reasonably rigorous; and that the effort to instill field skills is consistent with the industry’s view.  From the ongoing, intensive study and discussion of the geology industries and the Federal Government concerning human resource needs for the minerals industry , it is clear that the skilled and technically savvy workers who could enjoy a lifelong career in a applied geology are difficult find. Discussions by MIRH have centered upon identifying and attracting under-represented parts of the population(immigrants, indigenous persons) to careers in applied geology, and trying to explain the viability of the careers to under-represented groups, women for example. For example, the recent conversations have occurred to reevaluate the explanation of work, working conditions, and training in an effort to attract more people to the workforce.  Of course, as the minerals industry works harder to do this the engineering , planning, hydrogeology , and environmental geology sectors will have a dwindling pool of new workers to select from.  This perennial need for education and enlightenment about the lifelong career possibilities in applied geology is also a detail that the College should pay attention too. This program area should be continually marketed by the institution rather than intermittently mentioned. Perhaps the College can broaden it’s strategies to address this prospective student pool more effectively or in more diverse settings. It is clear that the technical knowledge and proficiency (and the capacity to be trained in this career path) needed to be effective in geology rests in a small subset of the population. That group is being offered more and more options as Colleges and Universities create new programs. There is a competitive challenge to be met by the geology industries and the college.  1.1 Applied Geology Industry Trends:  The general situation projected by the Federal manpower assessments ,across the Engineering, Materials, Exploration and Mining industry, suggest that worker numbers in 2015, 2016 have generally matched industry needs in the mining related occupations and have nearly done so in the engineering sectors during 2016. In 2016 Fleming graduates were well received by employers and some summer work positions were still being offered mid summer 2016 suggesting the pool of applicants with relevant background for engineering companies is not deep. Supporting that observation, is the following comment in an article in the Northern Miner Newspaper, February 2016:  “Meanwhile, university geology departments shrank and today we cannot replace more than 25 per cent of the geologists in the industry, far less replace the globally recognized experts in their field, now in their 60s and 70s”.  Morrison, Douglas, 2016, New mindset needed for exploration, Northern Ontario Business  That observation illustrates the trickle of earth science students will not match workplace needs in the near term, with respect to professional registration. Each year 15 to 20 percent of graduates continue studies at University with a goal of attaining Professional Geologist standing. It is clear that Universities are undersubscribed; yet recognizing the shortfall in human resources in the geological specialties; witness for example, the new geology program just approved, at Trent University. It has a mapped out pathway for Fleming ERT students to gain entry and optimally accomplish a university degree with about 2 years of additional studies.    Program Alignment with Applied Geology Trends:  The extraordinary high percentage of graduates who immediately work in applied geology suggests that the curriculum has continued to track technical and social changes in these workplaces with success. The current co-op form of the program has resulted in hundreds of recommendations, conversations (with students, employers) which keep the curriculum relevant. The flux of feedback continues to inform the College of trends and needed resources.  The College has not replaced the full time geophysical expertise of Grant Bashford. The two full time and some contract Faculty continue to strive to engage the students with tools and ideas leading to relevant and timely work in the industry in the geophysical field, but curriculum and skills development regarding this higher technology component of the program has been challenging in 2016 and will be more so in 2017 as the infrastructure to deliver the program will be dismantled and replaced.  1.2 How the Program Fits the Strategic Mandate,  Short Term Planning, and Justification for Expansion  An indicator of the fit of the Earth Resource Technician program within the School of Environmental and Natural Resource Sciences was study commissioned by the Fleming College President’s Office in 2012, to evaluate the relevance and sustainability of geology as an avenue of study at Fleming and to assess capitalizing growth.  This study was commissioned using the external services of Dr.Michael Cooke, and resulted in a documented and detailed technical report, “The GeoCentre At Fleming”, A Commitment to Excellence in the Earth Sciences, Business Case and Development Plan 2012-2016. The recommendations of the report have been partially attained by the College. The Geocentre is currently the Lindsay campus focus of a successful Federal infrastructure grant won in the Fall 2016 which will permit the reconstruction of the soils and rock laboratories of the College. This funding proposal was the basis of a broadened rebuild of part of the Peterborough campus too.  The pathway for University studies has gotten wider, with the agreement of Fleming and Trent University for flow through of ERT students to a new University degree in geology and climate. The college has successful in attracting more applicants to the program in 2016, but this did not result in more successful acceptances. It is clear the College has recognized that such a program is needed. Winning infrastructure funding has simply confirmed the College’s finding.  1.3 Co-op trends 2016  This program is nearly unique at Fleming in that students must complete a co-op education requirement to complete the program. There is no alternate pathway for completion. Further it is recognized as one of few programs that is physics, chemistry, geology and math based in theoretical explanations and in applied training.  In 2016 the School ERT is housed in expanded its’ co-op offerings, (this has been happening more broadly thoughout the College system) but has not done this in the same way for each program, nor made co-op mandatory for some programs. Consequently the attraction of ERT co-op has been diluted as other options exist for students to get co-op work experience. Therefor some of the edge of several years ago, gained by offering co-op to attract new students to ERT has been lost. This is another area the institution should evaluate with a goal of improving external and internal marketing for ERT.  Those students who were eligible for co-op work, and focused on winning it, got very good work experiences through the summer and early Fall of 2016. However, it appears the % of the class eligible for , or interested in co-op work in the anticipated summer after semester 2 has gradually decreased. In interviewing students who have not accomplished a co-op job in the expected time frame a number of reasons come up repeatedly. One has to do with developing confidence and self- motivation to complete 1st and 2nd semester courses. Some completed all core (technical courses) but did not complete  a general education course requirement. Others did not job search as aggressively or as competently. Others waited for the College to post a course mark carried over from semester 1 and did not act on a job search until they were sure they were eligible to take the course (until the mark was official in late spring), hence, lost opportunity for some competitive positions. It appears to make little difference that students are encouraged and informed of The opportunities and pitfalls of gaining employment. Some have their own pace to accomplish the program.  Employer feedback in 2016 was replete with positive comments about the student workers and often contained suggestion that the student return to work upon graduation. | |
| **Industry Liaison**  **Review / discuss:**   * Program initiatives to maintain involvement with the industry / sector such as field placement supervisions, clinical, faculty renewal, professional learning, other professional affiliations, or community-based projects | | 1.4 Industry Contacts  The Program Advisory Committee is active and gradually changing in membership. It has representation from the minerals and engineering fields and continues to be an advocate for the program. | |
| **2.0 Curriculum Development and Framework** | |  | |
| **Curriculum Framework**    **Review / discuss:**   * Describe how your program demonstrates a learner centered approach and addresses our core promise to students concerning personalized learning and support. | | 2.0 Curriculum Framework  Program curriculum covers the normal content of a science program with due regard to the capacity students have to accomplish lab, field and independent studies. Student feedback is carefully considered.  During the past several years the courses have been modified to ameliorate student workload, timing of assignments and exams and weighting of course content commensurate with difficulty. Key performance indicator surveys measure the student comfort level with their learning process and show the delivery and support is appropriate. KPI metrics are average or above average for the program. | |
| **2.1 Outcomes from Curriculum Renewal**  **Review / discuss:**   * Key outcomes from the Curriculum Renewal processes of the past few years * Progress to date in implementing the recommendations arising from Curriculum Renewal * Success of the changes implemented and the means by which they are being evaluated | | 2.1 Outcomes past Program Review  The institution has focused upon contract Faculty hires, rather than full time staffing in 2016. The College has not been able to increase full time core faculty.  The longstanding issues of equipment and facility renewal still exist. A quantity of worn out or unused equipment was disposed of in 2016. The capital equipment request list lengthened. The facility issues listed in prior reports largely remain but will be completely dealt with by the Spring of 2018, when renovations to the earth science labs at the College will be complete.  As part of the Geocentre renovation the college will be approaching donors for support to renew, upgrade or newly acquired teaching equipment (laboratory and field equipment).  The steady attention to past student feedback through Provincial and in house surveys has resulted in 12015-2016 KPI surveys that place the program as “average” in terms of housing, equipment and curriculum delivery. This means that some of the academic disruptions and curriculum change which drove survey results downward in the early years of implementing the co-op scheduling and delivery have been successfully dealt with, improving the student’s academic experience, even as the facilities remained in need of attention.  . | |
| **2.2 Curriculum Sequencing and Alignment with Standards**  **Review / discuss:**   * The Ontario College Credentials Framework and the extent to which the program aligns with the provincial standards. * The program’s current admission requirements and their suitability in relation to program rigour and student preparedness * The extent to which course content, levels of learning, and assessment methodology are successfully sequenced and aligned between courses and across semesters | | 2.2 This section has not change since the 2015 program review.  This program has adhered to the general credentialing of Civil Engineering aims as it is unique in the Ontario College system. The measure of the college credential (diploma) was OACETT recognition of the student’s achievement for several regulated professional pathways during the years the program has a third year of technology training. Students can now only register to attain professional standing as a technician with OACETT. Students with sufficient academic standing can attend Acadia University and complete a degree in Geology and then register as a Professional Geologist. Communication with Acadia in 2015 indicates the students are still well prepared to undertake this pathway. Technically, by that measure the program course content remains relevant and demanding. The generic studies and ancillary supporting course and outcomes and consistent with provincial requirements and College directions.  The academic Admissions requirements are sufficient for the program however, the prospective student and parent attention to the requirements to complete a coop program must be better highlighted. This is particularly the case for international students. However, any prospective student needs to understand program completion includes the co-op course. Prospective students need to be informed that they are not placed in jobs by the College.  New students should be required to have a laptop computer or tablet in labs which has the capacity to run Excel spreadsheets. Many analytical spreadsheets are embedded in the program courses and form an integral part of the laboratory and field work. The student experience is limited, at this juncture, if they do not have this hardware.  Levels of learning and sequencing of subject matter are evaluated every semester and adjusted as new learning tools, training tools and knowledge are added to the program. Annual oversight is provided by the Program Advisory Committee and detailed curriculum mapping is provided, with current faculty input, by the Centre of Learning and Teaching. | | |
| **2.3 a) Curriculum Map**   * Review the Program Curriculum Map and discuss the extent to which there is alignment of vocational and course outcomes * Review / discuss the distribution and progression of Vocational Learning Outcomes, Essential Employability Skills, and General Education themes across the curriculum. | | 2.3 As attached in the Appendix and as accessible at CLT; reflecting delivery in 2016-2017  Planning occurred in 2016 to drop the Digital Imaging course from the program and distribute the teaching hours to the Rock and Mineral course, the Sampling Protocols course and the Geophysics course; capturing some remote imagery within these or other core courses. | |
| **2.3 b) Curriculum Map**  **Submit an updated curriculum map as an attachment to the Program Review Report** | |  | |
| **2.4 Delivery Mode**  **Review / discuss:**   * The *primary* modes used to deliver curriculum such as lecture, seminar, lab, applied project, field camp and web based courses * The rationale for, and appropriateness of, these delivery modes in relation to program learning outcomes * The degree and depth to which the program is providing work integrated learning experiences * The degree and depth to which the learning experiences are enhanced by the use of educational technology. | | 2.4 This section has not changed since the 2015 report  The primary delivery modes for curriculum are:   1. Lectures, Labs, interactive participatory learning of math, chemistry, and geology components supported by simultaneous use of geological teaching samples, site observations, current events and integration with older and contemporary learning in other courses. 2. Preparation for and work with applied geology employers to complete 650 to 1500 hours of paid work experience. 3. Curriculum and assignments and contemporary content placed on the learning system with follow up communication 4. Alternate text book supports available through library ebooks in some cases, as with some video resources through the library or the internet Archives. 5. Some further supported through copied notes and procedures 6. Individualized support on lab work and projects greatly expanding the student’s access to professional learning   The rationale for the learning methods and the depth of the experience:  These students in coop work or as graduates will have to work to a high technical and ethical standard with professional engineers and geologists or other so similar responsibility to the client and the public. It is very important that they actually accomplish the program outcomes and have decent technical skills in the office, lab and field. As geology is the study of the earth their knowledge and success must be field based and they should be learning with a constant dialog with professionals in the field they intend to enter. Co-op employment does much to strengthen their education. Their experiences are , however very individualized. Therefor the interaction in learning between professors and the students should be as frequent as possible to draw out those experiences and round out the knowledge for the whole class. Such has been the practice.  Educational Technology:  These tools are instrumental in spreading and displaying information. They are effective in bringing the world to the Campus and illustrating technology and change. Geology is a study of earth and earth materials from atomic particles to the solar system. Learning can occur with examples of applied knowledge at all scales and educational technology keeps shifting the mechanisms to reveal these examples with higher quality formats. The factual information and illustrative examples are steadily transferred to new formats.  There is a serious need for class sized numbers of college owned tablets or Trimble like data recorders (or a student owned device) linked to the remote imaging course of the program.  Educational theory:  The program delivery, strongly enhanced by Co-op, is focused on preparing persons who will aspire to professional registration under law as technicians, technologists, professional engineers or others of similar standing. The delivery is made in a thoughtful way to cultivate the potential of each student in the program. These folk enter the program as highly motivated candidates as they realized their program is demanding and depends on their individual efforts.  Therefor the technological components of core course are skill based, in the sense of manual accomplishment of tasks and critical thinking after detailed numerical assessments of lab and field work have occurred. Some students need quite a bit of support by Faculty through, for example, redundant examples/opportunities, to accomplish course outcomes. These folks are focused completely on solving technical problems. To different extents they welcome the chance to use their broader knowledge to solve issues of corporate responsibility or to address workplace dynamic or safety concerns. It is important to maintain some level of assessment and course work in all ERT courses that satisfy this aim of the students. Therefor some scientific/engineering learning in the program must be framed within social/political scenarios.  The use of library AV resources, internet links and a requirement for self- study using information that is not peer reviewed is a part of the normal discourse on a weekly basis. However, in some subject area the field work and safety consideration are not subjective and must conform to professional practice as expected in the relevant jurisdictions. Therefor much of the core curriculum will remain taught , in person, to gauge the student’s perception and directly address questions.  Geocentre renovations occurring in 2017/2018 should make more materials, equipment and networked support available to the students. | |
| **2.5 Assessment and Evaluation Methods**  **Review / discuss:**   * The program approach to learning assessment * The balance and frequency of assessment types across the curriculum and their appropriateness to course / vocational outcomes * Reflect and comment upon the variety of methods used to demonstrate outcomes. Are learner centered principles part of the assessment approaches? | | The methods of evaluation and feedback are standard assignments and testing methodologies that give the student an opportunity to present knowledge verbally, electronically and in written formats. Where it is apparent a learner is better with one sort of communication than another, it is fortunate that the program numbers are low enough that Faculty take note and seek discussion with individual students to assess knowledge effectively. Students are encouraged to revisit some of the subject matter to accomplish course outcomes where the conventional teaching and learning appeared to miss the mark.( in the case of the student availing themselves of support). | |
| **2.6 Curriculum and Diversity**  **Review / discuss:**   * Program strategies that support student diversity and promote understanding of diversity, including program culture / climate, curriculum content and approaches to teaching and learning | |  | |
| **2.7 Learning Pathways**  **Review / discuss:**   * Recent or anticipated initiatives that promote student pathways including high school articulations, dual credit, program laddering, dual diplomas, and university transfer, articulations, and partnerships | | 2.7 Accreditation Standards This section has not changed from 2015  The program is a provincially accredited co-op program and the college must conduct the business of the program in an organized and rigorous manner. The content of the program follows, in part the provincial standard for the civil engineering discipline, and provincial standards and expectations for generic studies and general studies. The program Faculty and content experts determine exemptions and equivalencies through alternate courses (on line for example), to insure parity is achieved. There is not a provincial standard for the program content. OACETT has the closest criteria for professional registration, either as mining technician or a geotechnical technician or environmental science technician. The colleges have not been receptive to ceding accreditation to that organization, though it is the provinces only professional designate for technician and technologist standing by law.  Thus accreditation currently rests in four areas, recognition by Universities, through MTCU, by virtue of Co-op accreditation and individually by our graduates registering and gaining legal professional standing through OACETT, P.Geol, or P.Eng..   1. The excellent relationship with Acadia University, combining credits for academic work well done at Fleming and co-op hours worked has resulted in the normal timeline to accomplish a University Degree in geology of 2 years at Acadia. This puts our graduates in a position to register as a Professional Geologist under statute in Canada.   2. A number of the students will register with the Ontario Association of Professional Technicians and Technologists, which can lead to professional registration, again under statute, in those roles. Our students are not on fast track to achieve technologist standing with OACETT in the engineering disciplines because the College does not have a three year program in the geology disciplines.  3. The program has a new pathway opening is about two years that can lead to to professional accreditation as a professional geologist. Fleming and Trent University have collaborated to set curriculum acceptable to the Professional Geologist registration for Ontario. | |
| **3.0 Student and Graduate Satisfaction** | | **Summary of Key Findings** | |
| **3.1 Formal Measures of Student and / or Graduate Satisfaction**  **Review / discuss:**   * Key Performance Indicator results for the program with a focus on #s 4, 8, 9, and 11 * Program status and positioning in relation to the KPIs of other programs of a similar type (where applicable) * Feedback and summary report from Learning Support Services (LSS) summary * Themes or issues emerging from a review of course evaluation summaries (Chair/Dean response here) | | 3.1 Key Performance Indicators  The program is average or above average with respect to student and graduate satisfaction with respect to 2015/16 data. The program is above average with respect to KPI measures related to employer satisfaction and employment rates after graduation. The detailed data is available through Fleming’s Data Research Centre. | |
| **3.2 Other Measures of Student and Graduate Satisfaction**  **Review / discuss outcomes from:**   * Student focus groups (mandatory component)      * Student Advisor observations / reports * Formal or informal discussions with students and graduates such as class councils, class representatives, individuals or delegations * Debriefing sessions following a field placement, clinical placement, or practicum | | 3.2 other sorts of student input to program development  All ERT students are offered meetings with the Coordinator multiple times during semester 1. About half avail themselves of this contact. All are in courses with the program coordinator and meet at other times with the coordinator. The class sizes are small, hence plenty of opportunity exists for discussion about the program. Students are encouraged to have a student group or club. The Dean’s office, may , from time to time have a formal meetings with students to get independent feedback.. This was done once in 2016. Students participate in open houses and in Program Advisory Committee meetings, providing other forums for informal discussion. | |
| **4.0 Employment Trends** | | **Summary of Key Findings** | |
| **4.1 Employment**  **Review / discuss:**   * Graduate employment statistics over the last few years, including those of students employed in the field, in a related field, outside the field, or unemployed, and any emerging patterns in this data * Student preparedness for entry-level positions * Emergent employment trends such as new types of positions, changing job market, regional distinctions, changing employer profile, or emerging skill shortages | | Based upon key performance indicators the program is presented to incoming students in week 2 as an example of 100% employment in the field of study. This is generally true but should be tempered with the statement that some students delay direct entry to the workforce to vacation, or enter it for summer work to return to University education the Fall after graduation. It is thought that most who undertake education after Fleming stay in geology for training and subsequently for employment. | |
| **4.2 Other Graduate Destinations**  **Review / discuss:**   * Alternative graduate destinations such as further education, international opportunities, volunteer service, or other experiences | | About 20 % of the graduates continue studies in geology. Most are going to Acadia University where they can complete a science degree in two years if they have high marks at Fleming and a lengthy coop work experience. | |
| **5.0 Strategic Positioning** | | **Summary of Key Findings** | |
| **5.1** **College Alignment**  **Review / discuss:**   * Program alignment with college priorities such as vision, mission, values, strategic plan, academic framework, and the educational mandate, and / or academic priorities of the School * Opportunities for new program initiatives based on Program, School, or community strengths and alliances | | The program has been instrumental in winning infrastructure funding I 2016 to rebuild the soil, water and rock teaching facilities at the campus. Geology is a fundamental science. Knowledge of how to effectively work with earth materials, select them and maintain life supporting landscapes and subsurface conditions is the very essence of the School of Environmental and Natural Resource Science. | |
| **5.2 Competitor Programs**  **Review / discuss:**   * Key parallels and differences between this program and those of its closest competitors, where applicable * ’Value-added’ program distinctions and their attractiveness to prospective students | | 5.2 As 2015, but:  Some college civil engineering programs have generated curriculum with co-op work terms from April to December. This work term is of interest to some engineering firms and is marginally more advantageous then the Fleming ERT 6 month work term. While these programs are not competitors in terms of content and diversity of work options they are problematic in a select group of entry level jobs, engineering testing during construction for example, where the employer wants to keep the same inspector on site from start in April to winter shutdown or slowdown in December.  The Southern and Northern Alberta Institutes of Technology, the civil engineering programs of Mohawk College, Conestoga College , St. Lawrence College and others, and the mining/exploration programs of Cambrian, Confederation and Northern College all capture some similar curriculum. However, none has duplicated the breadth of the Fleming program, none has the length of applied learning in co-op , or discovered the integration of geology, environment and engineering as the Fleming student benefits from. | |
| **6.0 Enrolment Trends** | | **Summary of Key Findings** | |
| **6.1 Demand for the Program**  **Review / discuss:**   * Patterns in the number of program applicants, qualified applicants, and actual registrants over the past 6 years * Changes, if any, in the student demographic profile, including level of maturity, diversity, prior knowledge, technological literacy, work experience, and expectations * Impact, if any, of this changing student profile on program curriculum | | Renovation of the teaching facility and marketing of the new Geocentre should bring the trend line of growing entry numbers back on track after the dip that occurred September 2016. The enrollment applications has steadily increased every year since converting the program to a co-op format. 2016 applications were up substantially over 2015, but the conversion of that interest to actual attendance did not happen and the Jan. 2017 class size is about 21, down from 26 in the prior year. Normally more student studying in semester 1 switch program to ERT. In Fall 2016 the conversion was low and students numbers entering the program was reduced. Further, some applicants to ERT switched to other programs. It is noteworthy that no geology professional had lecture contact with the 2016 semester 1 cohort; and students who applied to the program were significantly non-communicative when asked to attend a program meetings during that semester. | |
| **6.2 Student Progression**  **Review / discuss:**   * Patterns of student success and retention on a semester by semester basis over the last six years * The effectiveness of any strategies adopted to improve student success and retention | | Historically, student retention statistics have consistently revealed over 90 % retention from semester to semester up to 2012. At the changeover to co-op delivery, the program added a semester, semester 3, the co-op work term, All other semester transitions remained as in the past with respect to retention. The coop work term produces an apparently lower retention rate (in term of continuity of the student education) in terms of return to semester 3. This is situational as explained in the 2015 report. Earlier comments in this report also touch on this circumstance. | |
| **7.0 External Relations** | | **Summary of Key Findings** | |
| **7.1 Alumnae**  **Review / discuss:**   * The type and range of alumnae involvement in the program * Current and future strategies to engage alumnae in the program | | Alumni donate time, materials and research to the program in a variety of courses, participate in the Advisory Committee and advocate for our co-op students and graduates to industry. Recent graduates are following the same course, that of trying to help out and promote the program. | |
| **7.2 Community Relations**    **Review / discuss:**   * Significant partnerships, relationships, connections, or offers of support from the community that help to enrich the program and the student experience * Faculty, staff, and student involvement in volunteer projects and events * Contributions to the not for profit sector such as committee or board service by program-associated faculty and staff * Community recognition in the form of student bursaries, awards and scholarships | | The Faculty are active with respect to community donations, responding to questions about geology and the environment, responding questionnaires from provincial and federal studies, assisting primary and secondary teachers, and advising internal students and external candidates regarding ERT and other programs.  The Faculty participates in the planning process and outreach of the College and is active in the local municipal environmental advisory committee, through the coordinator.  Faculty were instrumental in the layout and recommended equipping of the new Geocentre Labs. | |
| **7.3 Program Advisory Committee**  **Review / discuss:**   * The distribution of Committee membership by constituency, sector, and / or region * The vitality of the Committee such as the frequency of meetings, and members’ level of participation, engagement, and turnover * The extent to which Committee operations are aligned with the Fleming College Advisory Committee Orientation Manual and Advisory Committee policy. | | The program advisory personnel are all well established and active professionals in applied geology. The group is more than 10 in number and currently is comprised of 50 % geotechnical/geo-environmental members and 50 % minerals industry members.  About half the members are alumni and of those one is from a separate program.  The program activity solicits assistance and criticism from the committee, meetings are consistently held, and the committee has been instrumental in the success of the transition to co-op and the development of the curriculum. | |
| **8.0 Program Resources** | | **Summary of Key Findings** | |
| **8.1 Human Resources**  **Review / discuss:**   * The number and distribution of all faculty, technicians, and technologists associated with the program including full-time, part-time, sessional, and cross-appointments * Profile of the Dean, faculty, and staff associated with the program including cumulative credentials, scholarship, work-related and teaching experience, and expertise in education * Significant faculty or staff accomplishments such as professional recognition and awards, achievement of credentials, and appointments * Contributions to the professional community or industry by program-associated faculty and staff including board / committee service, research, and presentations / publications * Current staffing levels for the program in relation to program   numbers, curriculum, delivery modes and areas of specialization / generalization   * Hiring priorities over the next few years based on the above * Current professional development and renewal plans in relation to program or student needs | | The College is dependent upon contract faculty for some of the program curriculum. It is difficult for contract faculty to evolve field experiences for the students, to maintain equipment or improve course materials, equipment or delivery. Some aspects of the curriculum would be better presented by experts in the subject area who are available to the students more (in the form of full time employees).  Further full time employees are better able to use the ancillary resources of the College to teach, have a better idea of how to use the grounds of the college, and through professional development can develop broader college contacts. In all these aspects programs, ERT being no exception, loose opportunity to improve learning and improve teaching resources. | |
| **8.2 Physical Resources**  **Review / discuss:**   * Program costing information * Scope of current program resources such as laboratory equipment, software, library holdings, or tools essential to or which enhance program delivery or student learning * The adequacy of above resources in the context of program outcomes, program currency, and student numbers * Program specific external revenue such as sponsorships, grants, donations or gifts-in-kind * Other externally generated revenues, if applicable | | The new Geocentre should correct decades of issues related to infrastructure by providing technology adaptive teaching spaces with better equipment and cleaner, brighter, warmer and hence more positive teaching areas.  2016 costing analysis by Fleming Data Research showed a rebound in the contribution to overhead. 2014 and 2015 showed the effect of taking on a new Faculty member, retiring a member and what happens when a supporting course, communication, needs to be reconfigured and the costs flow back to a small program. Prior to 2014 the program could contribute over 30% to College overhead. In 2016 it was contributing about 24% which was deemed enough to escape a detailed costing review. It is unknown if the contribution to overhead will remain at that level through 2017 as the whole program delivery will be disrupted by construction of the Geocentre. | |
| **8.3 Challenges for Program Delivery and Expansion** | | The greatest problem for program expansion is the inability to get more than a quarter of the program applicants to actually attend the program. Because the program is small it gets little promotion by the college. Although the program is the one most involved with materials and equipment used by soils courses given to most of the students at the school, it has the least full time faculty available to provided guidance and critical comment on developments in this subject area.. | |

File Program Review report in: **S:\shared data\CLT\School Name\Program Name**

Attach copies of existing and revised bench marks

Attach an updated Program Curriculum Map

**Based on an analysis of your key findings, identify areas that require attention.**

**Develop recommendations and an action plan that reflects the program’s priorities and its capacity to achieve them.**

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| **Program Review Action Plan** | **Responsibility** | **Timeframe** |
| **Recommendations (2016)** | | |
| 1 remove the digital imaging course and put the hours into other courses, Mineralogy and Petrology, Geophysics and Sampling Protocols | B.Gerry | This has been implemented and is in the 2017 winter workloads |
| 2. The program continue to input information to the Geocentre project | Faculty and Advisory committee | 2017 to Spring 2018 |
| 3. Continue to lobby for a full time position with a person so involved having detailed skills in Geophysics | B.Gerry and | Coop has been implemented |
| 4. The balance of deferred items, 2015 report , as noted below. | B.Gerry |  |
| 5. Management and timetabling should review best practices to select timing and location of courses so that course delivery that is academically problematic to get fixed.  This sort of issue is dealt with in early stages of each semesters delivery planning,  However, In the case of curriculum rebuild and/or bringing in new contract Faculty, the school should have capacity and flexibility to adapt to reconfiguring course location and timing of delivery if the Faculty advocate for it and the students approve and the space is empty. | Team Chair, and Scheduling |  |
| **Recommendations (2014/2015):** |  | Notes 2016 regarding 2014/2015 reporting |
| Significantly increased content and rigor in semester 1 preparation courses (CFS redesign – changes to ECOS 13). | CFS, ERT and  RDB coordinator,  Chair | Improvements have been made to the CFS, but the geology specific content and opportunities in geology are not commensurate with the clear career possibilities or human resource needs. |
| Increase rock and mineral sample collections, as well as rock, mineral and exploration teaching materials in order to support an increase in rock and mineral curriculum content. | Chair,  ERT faculty | On-going |
| Increase soils and aggregate training of semester 2 students and introduce pavement design in the Soil Mechanics course. | ERT faculty and coordinator | Winter 2017, in progress |
| Review assessment plans for all courses (core and non-core) in order to reduce student workload. | ERT and non-core faculty, CLT | See the notes in 2016 on deleting and redistributing the Digital Imaging course. |
| Improve laboratory facilities, maintain them adequately and/or renovate. | Facilities, Space Planning | See the welcomed Geocentre rennovations noted in the 2016 report. |
| Determine acceptable equivalent core and non-core courses for students that satisfy the ERT diploma requirements. | ERT coordinator,  Registrar’s office | In progress |
| Include input by ERT coordinator into contract faculty hiring in order to improve student satisfaction and curriculum quality. | Chair | Still not a seamless process |
| Explore timing of the co-op component and the costs to students of housing given the extended period of the co-op work term. | ERT and Co-op coordinator, CLT, Chair | Discussed in 2015 |
| Moderately increase applied learning (increase field time in academic courses). | ERT faculty | On-going |
| Provide students with further detailed expectations regarding co-op course sequencing and provide alternate times to get this program component completed. | ERT and Co-op Coordinator, Registrar’s Office | On-going |
| Place the Co-op Prep course in the first seven weeks of Semester 2 and the Sampling and Safety course in the back seven weeks. | ERT Coordinator, Chair, Registrar’s Office, CLT | Done |
| Create a plan for encouraging more direct involvement of industry and alumni in program delivery (e.g. guest speakers, materials and/or equipment donations, Fleming hosted forum/panel). | ERT faculty | On-going |
| Convert paper and analytical teaching materials into AODA conversion ready digital formats. Research possible software donation from industry. | ERT faculty, LSS | On-going |
| Replace the Digital Imaging Processing for Natural Resources (NATR 7) course with a dedicated ERT course in Remote Sensing of abiotic natural resources. | ERT and GIS faculty, CLT, Chair | Winter 2017 as noted above |
| Investigate the requirement of laptop or tablet use in the lab. | ERT coordinator, Chair, Admissions | On-going |
| Incorporate the use of smart phones as data collection devices in core courses. | ERT faculty | On-going |
| Continue to foster the steady increase in prospective students that enter the program each fall (about a 40% increase in the last 4 years). | ERT faculty, Marketing, Chair, Dean, alumni | On-going |

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| **Program Name: Earth Resource Technician Program Code: ERT Date Updated: Jan 18, 2017 to go with 2016 renewel report** | | | **Vocational Outcomes** | | | | | | | | | | | | | | **Essential Employability Skills** | | | | | | | | | | |
| **Semester 1** | **Course #** | **Course Name** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| COMM44 | College Communications for Environmental Science |  |  |  |  | x |  |  |  | x |  |  |  |  |  | x | x | x | x | x | x | x | x | x | x | x |
| ECOS13 | Ecosystem Skills | x | x | x | x | x |  |  |  |  |  |  |  |  |  | x | x | x | x | x | x | x | x | x | x | x |
| ENVR20 | Ecology and Environment | x | x | x | x |  |  | x |  |  |  |  |  |  |  | x | x | x | x | x | x | x | x | x | x | x |
| GEOM36 | Geospatial Techniques | x |  |  |  | x |  |  |  |  |  |  |  |  |  | x | x |  | x | x | x | x | x | x | x | x |
| MATH63 | Applied Mathematics in Natural Resource Sciences |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x | x | x | x |  | x | x | x | x |
| NATR8 | Skills for Stewardship and Sustainability |  |  |  |  |  |  | x |  |  |  |  |  |  |  | x | x |  |  |  | x | x | x | x | x | x |
| **Semester 2** | **Course #** | **Course Name** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |  |  |  |  |  |  |  |  |  |  |  |
| APST89 | Co-op Preparation |  |  |  |  |  |  |  |  |  |  | x |  |  |  | x | x |  |  | x | x |  | x | x | x | x |
| COMM34 | Technical Reporting |  |  |  |  | x |  |  |  | x | x | x |  |  |  | x | x | x |  | x | x |  | x | x | x | x |
| COMP461 | Data Management for Environmental and Natural Resource Sciences | x | x |  |  | x |  | x |  | x | x |  | x |  |  | x | x | x |  |  |  |  | x | x | x | x |
| GEOL17 | Geo-Environmental Site Investigations | x | x | x | x |  | x |  | x | x | x |  | x |  |  | x | x | x | x |  | x |  | x | x | x | x |
| GEOL42 | Introduction to Mineralogy and Petrology | x | x | x |  |  | x | x |  | x | x |  | x |  |  | x | x |  |  |  |  |  | x | x | x | x |
| GEOL64 | Introduction to Sampling Protocols | x | x | x | x |  | x |  |  | x | x |  | x |  |  | x | x |  |  |  |  |  | x | x | x | x |
| MATH25 | Statistics |  |  |  |  |  |  |  |  | x | x |  |  |  |  | x | x | x |  | x | x |  | x | x | x | x |
| NATR91 | Soil Mechanics | x | x | x | x |  |  | x |  | xx | x |  | x | x |  | x | x |  |  |  | x |  | x | x | x | x |
| SCIE62 | Introductory Chemistry | x | x | x |  |  |  |  |  |  |  |  | x |  |  | x | x | x |  |  |  |  |  | x | x | x |
| **Semester 3** | **Course #** | **Course Name** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |  |  |  |  |  |  |  |  |  |  |  |
| APST100 | ERT Co-op | x | x | x | x | x |  | x |  | x | x |  | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
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| **Semester 4** | **Course #** | **Course Name** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |  |  |  |  |  | **6** |  |  |  |  |  |
| COMP12 | Computer Aided Drafting |  |  |  |  | x |  |  |  | x | x |  | x |  |  | x | x | x | x | x |  | x | x | x | x | x |
| GEOL39 | Surficial Geology | x | x | x |  |  | x |  |  | x | x |  | x |  |  | x | x | x | x | x |  |  | x | x | x | x |
| SCIE65 | Geochemical Environmental Analysis | x | x | x | x |  |  |  |  | x | x |  | x |  |  | x | x | x |  | x | x | x | x | x | x | x |
| SURV22 | Surveying for ERT | x | x | x | x | x | x |  |  | x | x |  | x |  |  | x | x | x | x | x | x | x | x | x | x | x |
| GNED66 | Introduction to Improv |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x | x |  |  |  |  |  | x | x | x | x |
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| **Semester 5** | **Course #** | **Course Name** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |  |  |  |  |  |  |  |  |  |  |  |
| GEOL12 | Geophysical Methods | x |  | x | x |  | x |  |  |  |  |  |  |  |  | x | x | x |  | x | x | x | x | x | x | x |
| GEOL21 | Principles of Hydrogeology | x | x | x | x | x | x | x | x |  |  |  |  |  |  | x | x | x | x | x |  |  | x | x | x | x |
| GEOL34 | Sampling Protocols | x | x | x | x |  | x | x | x |  |  |  |  |  |  | x | x | x | x | x | x | x | x | x | x | x |
| GEOL35 | Stability of Earth and Structures | x | x | x | x | x | x | x |  |  |  |  |  |  |  | x | x | x | x | x |  | x | x | x | x | x |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| GEOL48 | Rock Engineering | x | x | x | x |  | x |  |  |  |  |  |  |  |  | x | x | x | x | x | x | x | x | x | x | x |
| GENED | General Education Elective |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x | x | x | x |
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Descriptions of the fields on the program map follow on the next page.

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| **Vocational Outcomes:** | |  |  |
| **The graduate has reliably demonstrated the ability to:** | | |  |
| 1 | Identify, classify and recognize the significance of a range of environmental samples and features in laboratory and field conditions, in accordance with professional standards and agency protocols. | | |
| 2 | Work safely in compliance with applicable municipal, provincial, and federal government legislation and guidelines, as well as industry standards and protocols. | | |
| 3 | Collect data, map and perform field and laboratory tests and analyses on representative environmental samples (soils, water, rocks, minerals, aggregates and anthropogenic materials, e.g. asphalt, concrete), in accordance with professional standards and agency protocols. | | |
| 4 | Competently calibrate, use and maintain field and laboratory equipment according to industry standards. | | |
| 5 | Use information technology tools, to effectively assemble, synthesize and present environmental data, in accordance with professional standards and ethics. | | |
| 6 | Evaluate appropriate field tests and field activities for site investigations in compliance with industry regulations and agency protocols. | | |
| 7 | Apply sustainability principles to environmental management activities and projects, in compliance with standardized environmental protocols, policies and procedures and industry regulations. | | |
| 8 | Conduct environmental risk assessments to identify hazards, opportunities or potential risks to human health and the environment in accordance with industry regulations and agency protocols. | | |
| 9 | Communicate technical information accurately and effectively in oral, written, and visual forms, to numerous stakeholders, in compliance with industry standards and established protocols. | | |
| 10 | Act in accordance with industry norms and professional codes of ethical practice. | | |
| 11 | Prepare a portfolio of best practices that reflects personal growth, job readiness, and resources for ongoing professional development and learning. | | |
| 12 | Provide basic project management support in accordance with professional standards and ethics. | | |
| 13 | Demonstrate a basic knowledge of corporate strategies and practices within a multi-stakeholder environment. | | |
| 14 | Complete a Co-op Placement which meets the needs and expectations of the individual, the employer and the college, while adhering to legal, ethical, and professional standards and agency protocols. | | |
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|  | **ESSENTIAL EMPLOYABILITY SKILLS OUTCOMES** | | |
|  | **The graduate has reliably demonstrated the ability to:** | | |
|  | 1.    Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and the needs of audience. | | |
|  | 2.    Respond to written, spoken or visual messages in a manner that ensures effective communication. | | |
|  | 3.    Execute mathematical operations accurately. | | |
|  | 4.    Apply a systematic approach to solve problems. | | |
|  | 5.    Use a variety of thinking skills to anticipate and solve problems. | | |
|  | 6.    Locate, select, organize and document information using appropriate technology and information systems. | | |
|  | 7.    Analyze, evaluate and apply relevant information from a variety of sources. | | |
|  | 8.    Show respect for the diverse opinions, values, belief systems and contributions of others. | | |
|  | 9.    Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. | | |
|  | 10.  Manage the use of time and other resources to complete projects. | | |
|  | 11.  Take responsibility for one’s own actions, decisions and consequences. | | |