**Program Review Self Study Template**

| **Program Coordinator:** | | **Brian Gerry** | **School:** | **SENRS** |
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| **Program Code:** | | **ERT** | **Date Completed:** | **April 9th, 2015** |
| **Program Name:** | | **Earth Resources Technician Co-op** | | |
| **Indicator**  **1.0 Industry Trends** | | **Summary of Key Findings** | |
| **1.1 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:  The Program Coordinator of the Earth Resource Technician Program, Co-op (ERT) with the assistance of others, presents this documentation of the evolution of the program over the past 5 year period.  It is timely to assess the significant changes that have occurred in program delivery during this period as it became a co-op program in 2011 and the impact that change has had on faculty, students and industry. The transition to an applied geology program with a co-op component has prompted intense and ongoing curriculum adjustments to compliment and capitalize upon the students’ work experience.  The introduction of a 6 month period, mid program, monitored and evaluated, paid work term in applied geology reversed the downward enrollment trend for this program. It also generated a great deal of employer attention and feedback. It has also stimulated frequent queries from prospective local, countrywide and international students.  This review is an opportunity to examine the curriculum taught and the real needs that have become apparent to support today’s program. It also highlights lessons learned from the program transition to a co-op format. In particular, it has become apparent, regarding student satisfaction, that equipment and infrastructure need renewal. More detailed discussion is needed on an ongoing basis between staffing managers and program faculty. Another part of this review process is to project the experience of today forward in time, and ask for further support as student numbers should grow if the College promotes this program.  Applied Geology Industry Trends:  Locally: Industry trends in applied geology are summed up in two words: infrastructure and development. The evidence of significant employment opportunity abounds, even in the Lindsay area. The extension of Highway 407 south of the campus is a major infrastructure project. It is, and will be (for the next several years), generating new work in development, and resource/ land use related employment that is ideal for Fleming students. With the past three years of students working in co-op jobs, largely within 150 kilometers of the campus, regional employers are cognizant of the College, the program and the potential of ERT students to meet their needs. Employers are now communicating positions for employment to the College year round. This activity should increase in the future. Site plan revision, resource extraction reporting, land, engineering and property surveying, and site locate services employers are all requiring new staff. The most recent (2015 job fair) has revealed that 5 geotechnical firms will be attempting to hire over 50 persons in applied geology and many of these positions can be filled by ERT students.  Regionally: With respect to major infrastructure and development work, Western, Eastern and Central Ontario are on the verge of implementing public transit expansions in Ottawa, Kitchener- Waterloo and Toronto. Multi-billion dollar projects are also nearing activity with the new international bridge at Windsor and with the replacement of the Champlain Bridge in Montreal. Construction in Metropolitan Toronto is also buoyant.  With respect to minerals and mines, there are currently about 42 major mining operations that are active or in development in the Ontario minerals sector, quite apart from the soil (aggregate) and rock mined for construction purposes. Using academic, student and corporate input, the Association of Prospectors and Developers has completed an in-depth survey and concluded that human resources shortfalls are occurring with respect to all levels of employment in their industry (Building a Human Resource Development Roadmap: Summary of feedback from PDAC members and stakeholders, February 2014). In summary, the volumes of these materials being moved and processed is immense and the labor pool is not adequate.  Students working in mineral engineering activities are involved in surveying, quality control work, ground water assessments, assaying, geophysical exploration and a suite of other geological mapping/exploration roles.  The current business news in the Ontario minerals industry relates to the industrial mineral graphite, and the copper, iron and chromium deposits in a Northern Ontario area characterized as the “Ring of Fire”. There will be extensive northern infrastructure development related to mining in the near future in this area. A complication of development in this region is the northern climate (and permafrost impacted subgrade materials). This will require specially trained people to build the infrastructure in these remote locations. Thus, there will be a need to train technical people for quite a variety of civil engineering, and mining development jobs specific to this region in the North.  A proposal has been made to collaboratively utilize the resources of Northern College, Confederation College and Fleming College in an effort to accomplish the needed education and training for that region. An upward trend in human resource demand by the Northern mining sectors usually results in pressure upon the other applied geology employers as they try to locate good quality earth resource technicians.  Nationally: Multi-billion dollar projects, such as the C3 hydro dam project, pipelines, new shipping facilities, and materials handling facilities, have been approved and development is imminent in British Columbia. The national human resource trends, as assessed by the Federal Government through Employment Canada and specifically the Mining Human Resource Council, denote a better than the average outlook for job seekers as long as people are situated in the right locations. With respect to new ERT students, new career paths are arising in pipeline construction, pipeline rehabilitation, oil patch and natural gas extraction, and environmental and construction roles linked to those activities.  Broadly speaking the minerals industries alone will experience hiring to replace many of the 56000 workers who are reaching retirement age in the next decade. There is clearly a need for more workers in applied geology and therefore more impetus to, in a measured way, attract and train skilled analytical workers.  Trends noted by the Program Advisory Committee; and Advice from the Committee (2014 minutes of the committee are in the Appendix)   1. The engineering sector would enjoy short term technological training involving foundation construction, pavements, contract management, error reduction, and construction surveying if it were delivered by Fleming. 2. The minerals sector would like Fleming involved in site management training for junior staff related to site layout and drilling programs and logistics. Mining lands management has expanded in scope with each province regulating and documenting (with interactive on line software) mineral land resources. There is also a need for minerals engineering technicians with more training in material identification and core logging. This input is coming from both the conventional mineral extraction sector and from the engineering side through a cement and quarry operator query. 3. The energy pipeline construction sector needs quality control personnel and safety personnel who have knowledge of soils, soil stability, corrosion analysis and soil pipeline interactions. 4. The geophysical firms have mitigated some the past two years of reduced activity in mineral exploration by supplying environmental site mapping services. Geophysical work involves remotely sensing variation in the subsurface and determining what is causing that variation and the volume of earth that is anomalous. The technology has advanced, however, and methods that formerly could only define large targets have become quite precise and sensitive permitting higher definition of changes in the subsurface. Education with respect to geological properties, instrument responses and software are a good fit with the College. Furthermore, XRF device (a point and shoot analyzer for elements in rocks and minerals) usage is becoming quite common and should be embraced by the program. 5. Over the last thirty years there has been a shift of quality control obligations and responsibilities from the province to construction companies and materials suppliers. This has expanded the numbers of private laboratories and the need for qualified personnel to operate the same. Hence, there is a growing interest in ERT students by geotechnical and geo-environmental firms. 6. Technology training in geotechnical work is not available to the extent engineering firms wish. And in both the geotechnical and minerals sectors, support staff with geological knowledge coupled with business and technical skills are difficult to attract.   Program Alignment with Applied Geology Trends  The program successfully sets up willing students to open the doors to most career paths in applied geology. The extraordinary high percentage of graduates who work in applied geology suggests that the curriculum has continued to track technical and social changes in these workplaces with some success. The current co-op offering of the program has resulted in hundreds of recommendations, conversations (with students, employers) and many faculty site visits to industry during the past four years. The influx of feedback continues to inform the College of trends and needed resources.  The College hired a Professional Geologist (Joanna Hodge) with recent and detailed field experiences, to further support this activity. The College did not replace the geophysical expertise of Grant Bashford, upon his retirement. In this respect, the College is not following the high technology trends of mineral, water, spills and rock structure exploration, which have been key to many graduate jobs. The 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 the scope of this part of the program has been temporarily reduced.  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 has been the commissioning of a study 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. This report strongly advocated a “GeoCentre” for the Frost Campus by building upon the Earth Resources Technician and Resource Drilling and Blasting (RDB) programs. Highlights of the report are facts coinciding with College and school planning for ERT; that the program should double in size by 2015, and should see renovated facilities and faculty renewal.  Some of the broad strokes of how the program might evolve as explained by this study follow in regards to a GeoCentre at the Frost Campus (involving RDB and ERT):   * 100% more graduates by 2016 * Renewed curriculum * Post-graduate certificate by 2015 * Renewed Facilities by 2014 * New entrance and exit pathways * Collaboration (a resource centre) in program or course delivery with Northern Colleges, * An accreditation plan by 2015 * Even broader industry engagement   In the two years since this report the College has made some headway on a few of the objectives:   * The ERT program intake has improved 41% with extra-ordinarily little marketing, nearly zero infrastructure improvement, and virtually no change in the number of full time faculty members at this point; there was a retirement of one and a hiring of a younger, seasoned faculty member with different expertise (there was complimentary growth in the Resources Drilling and Blasting program). * The Co-op course offering was in the second iteration when the report was commissioned and was highlighted as a key component of program development and GeoCentre development. * The College agreed to the study of post-graduate programming and the Program Advisory Committee concurred in principle, but the technical thrust of such an initiative is still in discussion.   Within the School of Natural Resource and Environmental Science, the presence of geologists/engineers as professors, and the subject matter of applied geology is the vehicle that gives ERT students capacity to actually solve practical problems and investigate sites scientifically. The science of geology is a basis of understanding ground and surface water occurrence and chemistry, and certainly that knowledge dictates how every piece of landscape and subsurface resource is utilized. It is a fundamental component of the school, curriculum and will be a part of the planning consideration for curriculum developments in the future.  Employment and Labor Market Data  This review is comprised of three components; a “snap shot” of a limited number of relevant employment opportunities within a several day period in the Fall of 2014, co-op hiring, and graduate employment. The “snap shot” was accomplished by the Fleming Library Services Group and it was quite detailed in the exploration of some applied geology jobs being offered at that time. The complete study is in the Appendix.  The employment market snapshot, Fall 2014:  On a given day, there were about 52 full time jobs advertised across Canada in the select areas of geotechnical and minerals engineering. The snap shot did not capture green energy, surveying, land use planning, municipal environmental and engineering jobs or others that are specialized niche firms in engineering contracting, or public relations roles that our student aspire to.  In the context of the snap shot a great deal of other comparative data was captured. There is an expectation that 15% more employment growth will occur yearly in applied earth sciences compared to most other technical employment. Earth science occupations are cited as above average in salaries and long term job prospects, and about 24% of the workforce in these roles are female, which is a higher percentage than most professional occupations. Salary range is from 12 to 57 dollars per hour; with the norm near 27 dollars per hour. See the detailed information in the appendix. This information does not capture any of the seasonal or co-op hiring occurring across Canada in applied geology or related fields.  Impact of Co-op hiring:  Co-op hiring, coming into year four of this initiative, will be founded upon 40+ employers who have already hired semester two students for meaningful geology work. In addition, approximately 20 other firms/offices have carefully considered our students and, but for extenuating circumstances, would have taken on co-op students. The impact of these past employers’ decisions has been that the program faculty are fielding requests for co-op students and full time workers “off cycle” in the late summer, early fall and in the winter. These work opportunities are promoted to the College by direct industry to College contacts and it is suspected some are not captured by job opportunity surveys. The preemptive direct solicitation of the industry to the College for workers, full time and now co-op, has, since the last program review in 2011/12, shifted from April to late December, to the current situation of late August. This shift has been noted in both the minerals and engineering sectors. It is thought to be a direct consequence of the success of our students. A list of co-op employers, and likely future employers, is in the Appendix.  Graduate Employment and the incentive to continue higher education:  Employment rates are tracked by Provincial Key Performance Indicator Surveys. From year to year the numbers of respondents may be statistically problematic, but the summation of the results over a five year period illustrates that there is a very high probability that graduates will be in a earth science occupation upon graduation, or immediately after yet higher education (as university). The feedback from graduates to the program supports this data. Co-op employment has made this transition to full time work easier for ERT students. About 70% of those that have completed co-op reconnect with co-op employers. A number identify what they do not like about a co-op workplace and seek other areas of geology as a career path. The conclusion one might draw is that the College is attracting career path individuals and is giving them decent support to open employment doors. | |
| **1.2 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 | | Liaison with Industry and Criticism of the Program  The program has had 40+ firms hire co-op students in the past three years, prior to that the program made more than 140 email, phone and personal contacts with earth science professionals to establish a bona fide need for co-op positions in order to achieve co-op delivery approval. Every student is prepared by the College to search for work, succeed in an interview and win co-op employment. This process involves College personnel, guest speakers and alumni engaging the semester two students.  During the co-op work term, every employer provides written feedback on the students’ performances and suggestions for the program at least twice. Mentors and supervisors are also queried about the student and the program verbally.  .  Every co-op student provides further insights in group, and individual meetings with the program coordinator two to three times after the experience. Lastly, each student provides final written feedback.  There is a year round flow of job descriptions and work opportunities as a result of our students’ quality work. This activity informs the program of employment possibilities and changes in the nature of work available in the industry.  The net result is much more industry input to the College, than in the case of a conventional program. With this comes a drive to modernize and adapt to meet, as well as possible, industry recommendations. It also provides the students with many more direct forums to express an opinion.  The recent hiring of a Co-operative Education & Placement Officer (Anne Torwesten) to manage co-op documentation and industry contacts will streamline the information flow and accomplish a more consistent practice of melding student, College and industry to drive an increase in co-op activity in ERT (and other programs at SENRS). | |
| **2.0 Curriculum Development and Framework** | | **Summary of Key Findings** | |
| **2.1 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. | | This program has uniquely shared the student’s learning experience with industry in two ways. It prepares the student to engage in most of the diverse variety of workplaces in applied geology (it is not streaming the students to a niche career) and it gives the student up to six months of paid work experience in applied geology in the middle of their program experience. Their learning is blended in rigor, mentoring, self-expression, program inputs and uniquely supported by industry critiques that they must read and comment upon. Individually, they must win a job with an applied geology firm. Their confidence and compatibility has grown with this activity. The program faculty and others provide universal individual supports for this activity that likely exceed other programs. | |
| **2.2 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 | | Outcomes from 2009 Program Review and Ensuing Years of Curriculum Renewal:  The 2009 review listed a number of infrastructure and staffing deficiencies. The same issues of laboratories without window curtains, inappropriate seating and adverse seating arrangements, as well as, heavily used classrooms showing wear and tear exist today as they did in 2009. Digital hardware was finally upgraded and appropriately installed in 2013.The technical support for the program was reduced (in the case of some semesters is non-existent) during this five year period. The difficulty of getting soil and rock into the labs and maintaining any accessible stockpiles of these materials has not been solved. The program faculty was reduced to two full time professors after rising briefly to three. The goal of expanding the expertise of the faculty was delayed as the Geophysicist that retired was not replaced. The deficiencies in software for a number of courses have been reconciled by faculty developed technical, analytical spreadsheets and public access spreadsheets in some cases, and using student copies of software in others. The College did acquire approximately 20,000 dollars of capital equipment specific to program delivery. Furthermore, the staff has rebuilt a number of pieces of equipment.  During the period, from 2009-2011 the faculty, management and Advisory Committee moved the program to a Co-op delivery model (as planned in 2009). In the past 3 years, academic delivery has involved shifting content and course deliveries to provide the maximum curriculum delivery to students. This curriculum has been modified by student’s work experiences and through industry suggestions.  Industry guests have had some impact upon the program by generously providing current hardware and software to improve the students’ learning experience with respect to air and water monitoring. The more effective utilization of the senior chemistry professor has also complimented lab and field efforts to give students timely and relevant training.  Closer geological field areas were chosen for some training to increase the site time available to the students. The recommendations to increase rock and mineral training are underway and will be implemented in the winter 2015. This will enhance the knowledge and usage of mineral matter by semester two and five students.  In each of the past 4 years, curriculum renewal documents have been filed with the Centre for Learning and Teaching. These chronicle the progress and challenges of cultivating those students who are aggressive, demanding and self-motivated for a co-op program.  In 2011, faculty first dealt with students returning to the “new” fall semester (semester four). The students returned from work to five core geology courses in a seven week time period. This semester is now in its 3rd iteration. It has become better each subsequent year. Semester five, the last winter of the student’s experience has always been academically challenging. Faculty have to remember that ERT students have been solidly involved in their education continuously from September year 1 to April year 2 with little down time. Care is taken to keep the student workload reasonably like others at the school with care in exam scheduling and other aspects of workload.  Lessons learned through the past 5 years:   * Interview the students individually at the end of semester five and at the 1/3 point in semester five. * Ensure the College assigns courses to persons who are technically and scientifically adept in geological applications of knowledge learned. * Use learning software systems methodically to reduce student questions about content and assignments. * Continue to treat learning as if it is happening in the workplace. * Encourage completion of course outcomes. * The issues related to co-op delivery are twofold: normal logistical issues and problems relating to international student program completing. Logistical issues can be dealt with by implementing good student communication and using reasonable procedures to keep students on track to succeed. However, the second set of problems, related to international students, employer/employee relations, and documentation really are outside of the coordinators role and capacity to respond, as they touch upon College policy and practices. For example, international students are often attending in a finite time frame. What can be done if they do not complete a course, or do not win a co-op job?   The success of program changes during the five year period:   1. The fall intake numbers, as influenced by program registration rather than the prior common first semester registration, have steadily grown from the low 20’s to the low 30’s with a steady increase occurring each year. The program has been held to 1 group of students to learn in a measured way the business and impact of co-op on the academic studies. The result of these September numbers has been, in 2012, 2013 and 2014, a January compliment of 38, 34, and 34 respectively (with the addition of direct entry and drilling students). It has been clear in 2012, 2013 and 2014 some additional (international students) persons were available to enter the program but were unable to meet visa requirements. Enquiries for information, made directly to the coordinator, have climbed to well over 100 per year, compared to about 20 in 2009. 2. The number of students presenting resumes to industry has risen from 24 graduates a year to about 50 graduates and co-op students per year. The employee pool has doubled for industry. 3. The students are hired through College contacts in most cases. But in each of the last three years students have also won work in the minerals industry, the pipeline industry in western Canada and with smaller specialty companies that are all now newly informed about the ERT program and Fleming College. 4. The College has learned from timetabling, curriculum overlaps and delivery issues how to accomplish the changes in program and garner reasonable student satisfaction. 5. The program enjoys above average to top incomes for graduating technicians and the percentage of graduates proceeding into an applied geology job is up slightly from pre co-op years. 6. Most students get very good midterm and final reviews from employers, strengthening their self-confidence. 7. The College is determined to see growth in the program to two groups, meaning 42 to 60 students will be involved in co-op going forward, on the strength of what has been learned to this point.   The changes that have occurred since the last program review have been considered carefully by the program advisory committee. The program coordinator has received critical feedback from industry and students regarding the program, specific curriculum and the co-op experience. | |
| **2.3 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 | | The ERT program aligns with the Ontario College Credentials Framework as follows:  a) Vocational Standards  The complexity of knowledge and the vocational outcomes reflect the level of learning required to meet the standards of an Ontario College Diploma (ERT). Graduates have a wide range of knowledge, skills, and abilities in the technical areas of Applied Geology and they are more than adequately prepared for entry-level positions based on their field skills.  b) Essential Employability Skills  The essential employability skills are addressed at the appropriate level for an Ontario College Diploma. Graduates have achieved the fundamental, personal management and teamwork skills to pursue, keep and progress in their career. In most cases, they have also developed the necessary skills to enter further postsecondary studies if they so choose.  c) Program Hours  There are 1419 hours in the ERT program, 80 of which are allocated to the field placement experience. This figures aligns with the CVS framework which requires between 1200 and 1400 instructional hours for the completion of an Ontario College Diploma.  This program is unique in the Ontario College system and is credentialed under the Geological Engineering Technician Diploma description (MTCU code 54407). The measure of the College credential (diploma) is the OACETT recognition of the student’s achievement for several regulated professional pathways during the years the program had a third year of technology training. Students can now only register to attain professional standing as a technician with OACETT. However, 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 are consistent with provincial requirements and College directions.  The minimum admission requirements for the ERT program are as follows:  OSSD with the majority of credits at the College (C) and Open (O) level, including:  2 College (C) English courses (Grade 11 or Grade 12)  2 College (C) Math courses (Grade 11 or Grade 12)  When (C) is the minimum course level for admission, (U) or (U/C) courses are also accepted.  The academic admissions requirements are sufficient for the program. However, the requirements to complete a co-op course must be better highlighted. This is particularly true for international students. Prospective students need to understand program completion includes the co-op course and that they are responsible for finding their own co-op employment.  New students should be required to have a laptop computer or tablet with 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. | | |
| **2.4 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. | | In this review process, the ERT program faculty have documented how their courses align with the Vocational Learning Outcomes (VLO’s) of the program and the MTCU Essential Employability Skills (EES’s). At the course level, ERT program faculty have also determined whether the course learning outcomes are being taught, reinforced and/or assessed against the program VLO’s and EES’s.  The renewed curriculum map for the ERT program reveals for the most part a balanced alignment of courses to program VLO’s and EES’s with an appropriate progression throughout each semester. Areas in which a more in-depth analysis are required is in course alignment with VLO’s 7, 12 and 13 which appear to be low indicating possible gaps and VLO’s 1 and 3 which appear to be high indicating possible redundancy.  It is important to note that VLO’s 12 and 13 were better addressed in the years that the applied geology programing extended to a third technology year. In recent years this component was finally, successfully addressed by the move to co-op education. The 645 hours of applied learning in industry now more than imbues a sense of corporate behavior, business structure and professional ethics to the students. In addition, VLO 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.” and VLO 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.” may reflect the hands-on nature of this program.” An in-depth analysis will be undertaken by the ERT program team to confirm and address these possible gaps and redundancies.  The General Education requirements for the programs are met through two mandatory General Education courses: Skills for Stewardship and Sustainability (NATR8) in semester one, and Introduction to Improv (GNED66) in semester four. In semester five, there is a General Education elective option. | |
| **2.4 b) Curriculum Map**  **Submit an updated curriculum map as an attachment to the Program Review Report** | | As attached in the Appendix and as accessible in the shared CLT folder. | |
| **2.5 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. | | The primary curriculum delivery modes 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, assignments and contemporary content placed on the learning management system (D2L) with follow up communication. 4. Alternate text book supports available through library e-books 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:  Co-op students and graduates will have to work to a high technical and ethical standard with professional engineers, geologists or others with similar responsibility. They will be held accountable by the client and the public. It is very important that they accomplish the program outcomes and have adequate 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 in 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. Therefore 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 of the entire 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 the co-op experience, is focused on preparing students who aspire to professional registration under law as technicians, technologists, professional engineers or others of similar standing. The delivery is conducted in a thoughtful way to cultivate the potential of each student in the program. Students enter the program as highly motivated candidates as they realize their program is demanding and depends on their individual efforts.  Therefore 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 require a great deal of support by faculty. This has been accomplished by planned delivery of redundant examples/opportunities to accomplish course learning outcomes. Students are focused completely on solving technical problems. To different extents students 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. Therefore 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 areas the field work and safety considerations are not subjective and must conform to professional practice as expected in the relevant jurisdictions. Therefore much of the core curriculum will remain taught face to face in order to gauge the student’s perception and directly address questions. | |
| **2.6 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? | | All core courses have laboratory and field assignments that are a combination of data collection/documentation and reporting to “clients”. This prepares our students very well to participate with professionals in the applied geology industry. Particular care is taken with respect to the student’s workload and with respect to the content of assessments to efficiently obtain a valid measure of the student’s knowledge and judgment. Some of the assessment is verbal and some is collaborative between faculty and student. Examinations are conventional and students receive feedback quickly. Where students fail to meet the course learning outcomes, they are personally responsible to respond to faculty. It is highly suggested that students arrange a meeting with faculty to address the gap in knowledge. | |
| **2.7 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 | | Social issues play a significant part in this program as much of the work in applied geology is in regards to resource use, land use and peoples’ sensitivities, sensibilities and beliefs. For example, the Hydrogeology course has 6-8 opportunities for research and self- expression concerning the diversity of people, beliefs, opinions and needs with regard to ground water resources. The daily news abounds with inequities that different peoples have to contend with because of the environment they live in or the changed environment as a result of human effects. The program also attracts a broad spectrum of students from Canada and elsewhere from year to year and the exchange of the different perspectives and life experiences are occurring in the program. | |
| **2.8 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 | | Accreditation Standards:  The program is a provincially accredited co-op program. The content of the program follows the MTCU description for Geological Engineering Technician (MTCU Code 54407), the essential employability skills and the general studies requirements. The program faculty and content experts determine exemptions and equivalencies for alternate courses (on-line for example) to ensure parity is achieved. There is not a provincial standard for the program content. OACETT has the closest criteria for professional registration, either as a mining technician, a geotechnical technician or environmental science technician. The College has not been receptive to obtaining accreditation from this organization, though it is the only professional designate for technician and technologist standing by law in the province. However, students may take advantage of the following pathway choices:   1. Fleming College has a 2 + 2 articulation agreement with Acadia University. 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. Registration 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. Possible accreditation pathway for ERT students to P.Geol. standing is in active discussion with Trent University. Trent University recognizes a need for a geological degree with the correct science and humanity components to satisfy the Association of Professional Geologist of Ontario so that graduates merit professional standing. The intent is to create a Trent 4 year co-op degree program in applied geology in partnership with Fleming College. 4. Membership with any engineering, geology or environmental associations. Students are encouraged to join but are impressed with the knowledge that the professional standing they should work for is one they have earned that is legislated. That is, the faculty promote to the students that they should aspire to standings as: professional technician, technologist, drilling certifications, professional engineer, professional geologist, surveyor or other designations that are in the form of a professional licenses, as regulated by law. | |
| **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) | | Scrutiny of the “Key Performance Indicators” surveys of 2010 to 2014 reveal some of the consequences to the College of delivering a co-op course, as this was the period of transition, where employers began to contribute directly to student education. It is the view of the writer that some of the KPI data is incomplete and that some parts of the curriculum are not assessed by the surveys. It is important to understand that the questions relating to student satisfaction are answered by second semester students that are completing a rigorous semester and searching for co-op employment. Unlike some other occupations, the applied geology firms generally do not hire until semester end. Consequently the angst is palpable through the winter semester as the students await the moment to interview.  The following are observations about the KPI data.  Notionally Sound Data:  Graduation Rate:  The five year average graduation rate is 71% for ERT, compared to the College average of 66%. In the context of a co-op program, one should consider that, in addition to the normal expectation that some will not complete academic courses at the “normal” graduation date, the co-op work term completion is a mandatory part of the program. Some students are choosing to wait until after academic courses are finished to do the co-op work term. Therefore, students may be graduating at non-traditional times. From a coordinators point of view, the graduation rate published seems low. The annualized number should be near 80% of the Semester 5 students.  Working Graduates:  Graduates of the ERT program are very successful securing employment. For 30 + years, this has always been the case. The program success rate is an 87% employment rate in all careers. The SENRS average is 83%. Further it is noteworthy that about 10% of each graduating class is certain to stream directly to university into a science or engineering program.  Working in Applied Science Jobs:  The program percentage of graduates getting work in applied geology is 78% in contrast to the average College result of only 53% of other program graduates winning work in their field of study. The past three years of the program analysis reveals a steady growth in the number of program related employers. This is a natural “ramping up” of employer interest resulting from student job searching and College contacts. The ERT students are self-motivated to be in earth sciences, and are being given skills, knowledge and support to push for work in their field. The employers are clearly recognizing this. However, there were always similar high employment numbers in the past, because the College was preparing the right people with relevant knowledge and skills.  The College Learning Environment:  Co-op delivery has attracted quite competent students with high expectations. They are more mature and demanding of a quality environment. Further these students are encouraged, from the first meeting with ERT personnel, to be aggressive and to offer positive criticism. This support is part of encouraging them to win a job in applied geology. This character trait has to be applauded as they seek to win work with professional engineers and geologist, with only a brief introduction to the technological field they are entering.  In the graduating year, this self-confidence grows significantly, based in part, on the 5 to 6 months co-op work done in industrial settings. Year one students are well informed of the past year student successes. They already know there is a high likelihood that they can win a job! As the workplace is either scientific or engineering based these students anticipate good organization, current equipment and facilities, no significant content overlap, and faculty who are more than “one question deep”.  KPI data reveals the following:   1. Graduate Satisfaction with Generic Learning Outcomes, Program 83%, College 87%. 2. Satisfaction with the Overall Learning Experience, Program 80%, College 82%. 3. Satisfaction with the Teachers, Program 71%, College 75% (2nd semester). 4. Graduate Satisfaction with the Program, Program 82%, College 83%.   It is highly likely that the students responded to satisfaction questions a, b, and c based upon academic delivery issues at the College. They were not queried concerning 25 to 35% of their program hours, those being the minimum they experienced as co-op students. That component of their education is assessed in detail by employers and their own self- reflection. The mid-term and final employer co-op reports included student comments about their experiences. That documentation revealed a generally very high level of mutual satisfaction; and only rarely evidenced shortfalls in either employer or student expectations. The net result, upon return to academic classes has been a more mature, and outspoken student group.  Looking more closely at the contrast between the 2008 KPI results and the 2014 ones above, one notes these things:  Less than 50% of the class responded.  The program, as compared to the College system, had no KPI performance issues with related to preparing students for a career in 2008 or now.  The program, compared to the College system, is below average with respect to criticism of Generic and Vocational Learning Outcomes. The graduating students in 2014 had several situations concerning academic delivery that caused some frustration with respect to this subject matter.  Based upon most of the first and second year class responding: Satisfaction with teachers diminished over the 5 year period. It is noteworthy that the full time compliment diminished over the period and several delivery issues plagued the program.  All the KPI data referenced above is available through Fleming Data Research. Included in the Appendix are variances highlighted in the last two years. Where the variances are more than 3% it is the stated intent that the College improve the standing by 3% per annum. In part, the few program faculty can personally strive to improve KPI data, however, the infrastructure, program and capital funding, and renewal of faculty are management elections within the current structure of the College. Currently all working on this program delivery are working to get the best possible performance from the resources available  This data comparison, over a five year period, offers some clues about appropriate courses of action, with the caveat previous noted; the program delivery and content is not the same now as five years ago.  Student satisfaction suggests the program still requires some modification to keep the co-op student’s overall experience satisfying. The faculty have to be judicious in curriculum delivery and assessment choices to avoid overloading the students.  A dip in student satisfaction seen in 2013, has rebounded slightly in 2014. The program, in a more conventional College format, struggled to adapt to radical change a decade ago when the 3rd year of the program was terminated. The issue then was, what could be saved from the 3rd year experience, and if it were to be inserted into year one or two, how might that be done in a sensible fashion? In 2010, the program faculty took on the challenge again. This time, the intent was to cut out some curriculum and contact hours, and to substitute for College academic course work co-op learning. Students would get a minimum of 645 hours of paid work deemed equivalent, with technicians, technologists, scientists or engineers as mentors. The College is still in the process of striking a good balance for program delivery of academic courses. Further, on the basis of industry requests, courses are being re-sequenced to get more core content to the students before the co-op work term (into Semester 2). A consequence of re-sequencing is to make the compressed fall Semester 4 a little more varied in content, perhaps easing the workload at that time. Furthermore two courses are being team taught to bring more specialized expertise and content into the program, and gain emphasis on some of the basic skills. | |
| **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 | | All ERT students are encouraged from Semester 1 to be outgoing and to offer constructive criticism of the College, the program and their experience. They have to be “edgy”, a little thick skinned and persuasive, to win work in mining, exploration and construction. As has been mentioned, all students are interviewed, apart from group discussions, several times during the program to get feedback, and they have to provide it in writing in the context of their co-op reporting.  In the most recent focus group, students reported that they primarily chose the program for the co-op experience. Many students were surprised to find the program focussed on engineering with one student reporting, “No, I was expecting more rocks, less ‘Geotechnics’. However a new found passion has been made with this surprise.” Many students suggested that course materials and readings be updated, more readily available on D2L and in digital formats. Overall, students in the focus group found the program curriculum to progress throughout the semesters with enough time for review, that there was enough hands-on learning, and that they received their assessments back in an appropriate amount of time. Overwhelmingly, students did find pride in belonging to their program and rated the program 8 out of 10. The main suggestions for improvement to the program were that there be support for finding co-op placements, support for new teachers in the program, and improved facilities, equipment and mineral/rock sample collections. | |
| **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 | | The employers consistently rate the ERT students as high quality hires. The co-op component is solidifying this position with any new employer who has a good experience with Fleming ERT students. It has been a very rare case that an employer has a poor experience with either co-op hires or new graduates. In the Fall 2014 semester, a significant geotechnical employer solicited the program for any co-op students or graduates that could work immediately. In the early fall an employer of geophysical personnel was equally keen to get applications from the students. The industry is reaching out to the College at traditional and non-traditional hiring times at this point.  See earlier in this report comments on the future labor market. | |
| **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 co-op 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 is more heavily weighted in math and science topics than most at Fleming. Therefore one of the best linkages for a College student has been established with Acadia University. Currently discussions are ongoing with Trent University regarding a jointly delivered curriculum that would satisfy graduation requirements of Trent, in a different area of Geology.  Alliances with Northern College should lead all to benefit from a broader collection of teachers and resources that have a proven track record of meeting societal demands for applied geology specialists. | |
| **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 | | The Southern and Northern Alberta Institutes of Technology, the civil engineering programs of 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, nor offers an integration of geology, environment and engineering that 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 | | The statistical data is in the Appendix. The College has held the program to one group of students. The group size has ranged from 25 to 38 in the past 4 years. Personal communication with the admissions office suggests more direct entries could be possible. In the most recent year a historical trend of gaining a couple students from other programs in the first semester reversed. It appears several September applicants switched their preference from ERT to other programs. There is no change in the demographic profile since inception of the co-op delivery mode. The College advertised the co-op delivery somewhat in the first year of this activity, but did not follow up on that in recent years. | |
| **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 co-op work term produces an apparently lower retention rate (in term of continuity of the student education) in semester 3. This is situational as explained below, using the first year of co-op delivery as an example:   1. The College did not cap the 1st class in 2012 and permitted 38 to enter one group in Semester 2. There were 36 students present day 10, generating the base number of the % retention. 2. Some of the 36 students failed a course in Semester 2 and were therefore not eligible for the co-op work term. 3. Some of the 36 students would not pay for the work term until they had won a job and were therefore not a part of the analysis. 4. Some students did not do the co-op work term in the summer after Semester 2   These patterns will repeat to some extent every year. They are the primary contributor to the recent years, skewed and lower graduation rates at Spring graduation. Further to this, should a student get out of sequence with respect to the co-op component (fail to do it in the first summer session of the program), the College does not have an automatic mechanism of informing the student to re-register for it. Some “out of sequence” students assume they are re-registered for the co-op course automatically at the next offering. This sort of communication and documentation failure also biases the statistical record as the College has temporarily lost track of a full time student that needs to complete the co-op course.  It would seem that co-op work term completion offers challenges in terms of record keeping and statistical analysis. | |
| **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 program faculty are active with respect to community donations, responding to questions about geology and the environment, responding to questionnaires from provincial and federal studies, assisting primary and secondary teachers, and advising internal students and external candidates regarding ERT and other programs.  The program faculty participate in the planning process and outreach of the College and the program coordinator is active in the local municipal environmental advisory committee. | |
| **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 Committee 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 Dean has been a consistent advocate for the efforts to activate and sustain the co-op delivery of the ERT program. The recent retirement of Grant Bashford, a Professor of Geophysics, overlapped with the hire of Joanna Hodge, Professional Geologist with exploration specialization. The program consequently had, for a brief time three full time faculty.  The College plan is to have the program grow to two groups or sections of students. At that point, perhaps an additional full time person will be hired to replace Bashford’s expertise. His expertise was in the key high technology field that provided a serious boost to the credentials of our students.  The program enjoys the technical support of Bev Wiseman for part of each week and that of Pat Hogan, for the chemistry courses. In addition, the College has a good and capable (though see the notes below regarding limitations to versatility and adaptation) roster of permanent and contract faculty in chemistry, statistics, communications, surveying and so on. The permanent faculty are continually supporting/mentoring contract faculty and learning from them. This has incrementally absorbed more and more of the full time faculty work effort  The recent geologist hired was not intended to be a replacement in terms of specialization, for Grant Bashford. It had been anticipated that, with the growth planned for ERT Co-op, another geologist would be hired. | |
| **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 | | Program costing:  The typical contribution to overhead of this program, in the co-op delivery mode, is in the range of 28 to 33%, using the current metric of the College. In 2014, this contribution was less, in part, because of the financial impact of the College mandated Common Block Development time.  The space and equipment:  The geology teaching laboratories are dated, worn and poorly configured given the current class size. However, the available space is adequate for program delivery. Furthermore, the support and interaction with the Heavy Equipment and the Resources Drilling and Blasting programs help make the student learning experiences far better that other institutions. The excellent variety of geology on campus and nearby provides students with a broad exposure to soils, water and bedrock. It is easy to get the students involved in hands-on problem solving. They are generally very well served by the equipment inventory of the College and the transportation budget is adequate. The shortfalls in equipment lie in the lack of some individual learning tools in number and quality, software issues, AV issues, and intensive use of the teaching spaces by various programs, including ERT, leading to a cluttered learning environment. | |
| **8.3 Challenges for Program Delivery and Expansion** | | Industry quality lab facilities are required in order to deliver and expand the program. | |

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 (2009)** **(with comment on action items in the 2008 interim report and initiatives planned to enhance a co-operative education component):** | | |
| 1. 2008, Move the geology math course delivery model to include more spread sheet utilization. | B.Gerry  B.Elliot | This was covered off by the course and has been supported significantly in 2013/14 by the data management course improvements |
| 2. 2009, It is recommended as part of Program rationalization with respect to a Co-op work term and increasing credits that can be freely transferred to later institutions of learning that the Geology Math course be moved to semester 1. | B.Gerry  B.Elliot | The geology math was not moved, the content was checked against the CFS math, and through discussion the CFS math was upgraded. The Geology math was dropped in Semester 2 and the students now (2014/15) take statistics in Semester 2. |
| 3. 2008, Explore co-op education. An advisory committee meeting has occurred where this was discussed and some informal discussion has occurred with industry. The College is not currently willing to foster this discussion. | B.Gerry and  G. Bashford  B.Elliot | Co-op has been implemented. |
| 4. 2009, Contact industry and formulate curriculum redesign for a co-op component in the program. |  | ON-GOING at 2015 in that the program is responsive to the comprehensive feedback provided by industry. |
| 5. 2008, Increase industry training in the classroom with industry personnel and equipment. | All faculty | Industry training was accomplished in Fall Camp with 2 days of on-site training by industry; plus a day off-site and by 5 presenters on site, Fall 2008.  In Winter 2009, further industry liaising occurred within project work and direct equipment supply and training to the students.  Currently in 2015, the program continues to involve industry in academic delivery at Frost, and they are willing partners, hiring co-op students. |
| 6. 2009, Sustain industry training initiatives in the program courses; attempt by 2010 to have a co-op term. | All faculty | Completed. |
| 7. Tighten up, and enhance continuity of water focus of program, improve course notes, establish new industry links. |  | Courses have seen adaptation to improve curriculum in this subject matter.  The evidence from College to University transfer of course credit is that Fleming is doing a credible job in technical training of these subject areas.  In 2015, water is presented in technical, business and social context in core course delivery in ERT. |
| 8. 2008, Change field activity locations to reduce field trip costs and increase time in activities versus travel. | All faculty | Course site visits are now used for more than one course.  Completed, 2015. |
| 9. 2008, Re-catalogue geological materials. | All faculty | 2008/9, the program budget was marginally increased.  2015, ongoing and substantially done  The laboratories are being maintained better; summer 2009. |
| 10. 2008, Increase lab time (done for Rocks and Mineral course); get the Time Tabler to schedule all students with only core geology courses one day for field trip use. | B.Gerry, Dean and Time Tabler | 2015, two courses are split in delivery to get the best faculty in place for particular topics and training in geology. |
| 8. 2008, Encourage student participation in Claim Staking short course, mineral occurrence seminar and other similar activities. | B.Gerry | The Fall semester timetable 2008 incorporated a day per week free of classes for the ERT students. This was used for field activities and guest trainers.  At the onset of co-op the time for this activity was lost, but the evolution of the site investigation course to split delivery between faculty reintroduced some measure of exploration planning to the program.  Some students are getting field experience in this area through co-op (2013 onward). |
| **2008 Deferred actions:**   * Get more Faculty and expertise on board * Increase the program budget * Replace ancient geophysical equipment * Increase hours available for training and learning * Improve lab conditions and maintenance * Increase technical support hours * Web base some curriculum * Improve materials handling for labs * Deal with field trips and multiple student schedules to ease the delivery of field experiences * Reduce the number of special testing conditions. * Repaint classrooms * Recover lab tops * Remove equipment from storage rooms that is waste or surplus | Dean and Time Tabler | Fall 2008; some surplus and antiquated equipment was scrapped.  These concepts are intrinsic components of the curriculum re-thinking fostered by the effort to input a co-op work term. The planning is on-going.  Much of this has not been accomplished see the details in this current renewal report. |
| **Activity in 2009:**   * New seating is provided for the laboratories * An analytical chemist hire is pending * Some capital equipment purchases are pending * New issues: 2009-02-20 |  |  |
| **In view of curriculum concerns:**  1. It is known that some courses in the curriculum are not accepted by other institutions. An example is the 1 semester introductory chemistry course. | All Faculty; program and Inter-Disciplinary Studies and Technicians | It is recommended those ERT students who wish take the ERJ 1 year university level intro chemistry course.  The program is in the process of trying to identify alternate ways to meet program outcomes.  2015, It is time non-core coursed be revaluated in this respect. |
| 2. Some course information may be redundant if all students have coop work terms. |  | Very little of the curriculum content is redundant, except as reinforcement and as tools for problem solving in later semesters, as of 2015. |
| 3. Increase the capacity and confidence of students to do math and communicate effectively.  Other suggestions:  a. consider moving math courses to earlier semester.  b. consider changing a general education course to a communications course that is linked to one or more core technical courses.  c. increase hours taught in rocks and minerals |  | A new program learning package has been prepared to help improve student math capacity and confidence  2015, all these items have been addressed with good results. |
| 4. Acquire slope stability software; enter onto capital list. |  | The College is out of date with respect to soils and stability software; this is added to the capital list  2015, this has not been necessary as student versions have been used. |
| 5. The balance of deferred items, 2008 report, as noted above. | B.Gerry | Many of the deferred items indicated in 2008 remain outstanding today  Some are noted above. Others were minor issues. They have to do with the infrastructure, equipment for teaching, and computer hardware/software issues. To the institutions credit programs are willing share resources, the computer system has steadily improved and the teaching environment remains functional. |
| **Recommendations (2014/2015):** |  |  |
| Moderately increase applied learning by streamlining field time in academic courses to further build on the applied, hands-on learning of the program. | **ERT faculty** | **On-going** |
| Place the Co-op Preparation (APST89) course in the first seven weeks of Semester 2 in order to increase a student’s ability to secure co-op employment. In order to achieve this, the Introduction to Sampling Protocols (GEOL64) would need to be placed in the back seven weeks. | **ERT Coordinator, Chair, Registrar’s Office, CLT** | **Winter 2016** |
| Explore timing of the co-op component and the costs to students of housing given the extended period of the co-op work term to determine if co-op completion can be improved. | **ERT and Co-op coordinator, CLT, Chair** | **Fall 2015** |
| Provide students with further detailed expectations regarding co-op course sequencing and provide alternate times to complete this component to increase student success in the co-op component. | **ERT and Co-op Coordinator, Registrar’s Office** | **On-going** |
| 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) to further strengthen the program’s relationship with industry. | **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** |
| Advocate for the replacement of expertise loss in geophysics in order to improve student satisfaction and curriculum quality. | **ERT coordinator, Chair** | **On-going** |
| An in-depth analysis will be undertaken by the ERT program team to confirm and address possible gaps and redundancies discovered in program curriculum mapping. | **ERT faculty, CLT** | **Spring 2015** |
| Review assessment plans for all courses (core and non-core) in order to realign student workload. | **ERT and non-core faculty, CLT** | **Spring 2015** |
| Significantly increase content and rigor in Semester 1 preparation courses (CFS redesign – changes to ECOS 13) which is now in progress. | **CFS, ERT and**  **RDB coordinator,**  **Chair** | **Fall 2015** |
| Increase soils and aggregate training of semester two students and introduce pavement design in the Soil Mechanics (NATR91) as suggested by industry. | **ERT faculty and coordinator** | **Winter 2016** |
| Investigate the replacement of the Digital Imaging Processing for Natural Resources (NATR 7) course with a dedicated ERT course in Remote Sensing of abiotic natural resources to increase student satisfaction and curriculum quality. | **ERT and GIS faculty, CLT, Chair** | **Winter 2016** |
| Continue to convert paper and analytical teaching materials into AODA conversion ready digital formats. Research possible software donation from industry to accomplish this task in part. | **ERT faculty, LSS** | **On-going** |
| 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** |
| Advocate for improved laboratory facilities and maintenance of existing facilities. | **Facilities, Space Planning** | **Dependent on Space Planning** |
| Investigate the requirement of laptop or tablet for use in the lab. | **ERT coordinator, Chair, Admissions** | **Fall 2016** |
| Investigate incorporating the use of smart phones as data collection devices in core courses. | **ERT faculty** | **On-going** |
| Determine acceptable equivalent core and non-core courses available to students at Fleming and other institutions that will satisfy the ERT diploma requirements. This list of acceptable courses could then be used to help students determine a pathway to completing missing academic course credits in order to graduate with their ERT diploma. | **ERT coordinator,**  **Registrar’s office** | **Winter 2016** |