**Program and Curriculum Review Template**

*Instructions: Review all information that is stored on your program and curriculum review web page.*

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| Review Facilitator: | Val Bishop | Date Completed: | September 2018 |
| Program Name: | Advanced Water Systems Operations & Management | Program Code: | AWS |
| 1.0 Industry Trends and Employment | | Summary of Key Findings | |
| * 1. Labour Market & Occupational Standard Trends   Review and discuss the following:   * Industry / sector changes or issues identified by the Program Advisory Committee * Recent labour market data or sector reports as provided by the Fleming Library Researchers. * Recent or anticipated changes in occupational standards, level of entry and credential and / or standards of accreditation * Based on the above, do these changes or issues necessitate changes to your program, either immediately, or in the next few years? | | **Industry/Sector changes or issues identified by PAC:**  The AWSOM PAC meeting occurred March 23, 2018. Comments from Industry members consolidated below:   * “Engineers would be good to take the program to gain the operations and practical experience.” (Hayter, 2018) * “Challenge with co-op and considered summer students – if they are returning to school, they are not qualified to be hired; working on this.” (Murray, 2018) * “Trend happening at Durham – mobile type of applications are being used, and a significant amount of data entry, statistics along with analytical skills will be important.” (Murray, 2018) * “General trending: 2016 changed benefit provisions – huge year for retirement – numbers over the next 3-4 years show a lot of openings.” (Dunn, 2018) * “31% of class four operators in Ontario retiring in the next 10 years.” (Peeples, 2018) * *(PAC Member, 2018) “(program)* focus tends to have a focus on operations. There are so many other positions in the industry – maintenance, design, engineering, distribution and collection, and management – effect skills in communications, report writing (council reports, etc.)   **The PAC Curriculum Review surveys** (2018) also noted the following emerging trends:   1. “SCADA-controlled processes using in-line probes 2. Elimination of chlorine as a disinfectant of wastewater effluent 3. HACCP - Hazard Analysis Critical Control Point identifies weaknesses in process and develops procedures to monitor & control to prevent non-conformities 4. ISO Standards - Develop standardized procedures to ensure everyone is performing the same protocols, the same way, each and every time. Say what you do (write procedures) and do what you say (follow the procedures). 5. Many licensed operators retiring in 5 years. Need quality licensed operators with minimal investment to get up to speed. 6. Loss of staff through retirement - particularly class 3 & 4s. - Process knowledge decreasing in Industry. 7. I am not sure they will impact the program however STRATEGIC initiatives include: - energy management - 3D Design - Innovative Process”   **The PAC Curriculum Review surveys** (2018) also noted the following curriculum gaps:   1. “The "Co-Op" requirement becomes difficult to sustain as the program becomes more popular 2. More practical training. CSE and SCADA operations 3. The co-op placements do not meet the number of students entering the program. 4. I don't think there are gaps however the program is quite intense so the level of detailed understanding isn't possible. The market is quite dense people are applying for junior positions with a lot of certifications. 5. ability to interpret engineering drawings and technical specifications.”   **Recent Labour Market Data:**  “Employment outlook has been classified as ‘fair’ for the Province of Ontario” (Government of Canada’s Job Market Report, 2016-2018). The key factors influencing employment in this sector (Water and Wastewater Treatment Operators NOC 9243) are that “employment growth is expected to be strong, a moderate number of people are expected to retire and this occupation has recently experienced moderate levels of unemployment” (Government of Canada’s Job Market Report, 2016-2018).  “Employment of water and waste treatment plant operators has been relatively stable in Ontario in recent years. The majority of these workers are employed in the utilities sector, mainly by water filtration or sewage treatment facilities and provincial government agencies. More opportunites may arise as municipalities allocate for population and economic growth and invest more into government regulated water and waste utilities. Ongoing infrastructure development of commercial, industrial and public facilities will support a constant need for the occupation. Newly automated water and waste treatment productioin systems will need skilled operators who need to learn and be comfortable with engineering and technological changes.” (Government of Canada’s Job Market Report, 2016-2018).  “Water and waste treatment plant operators is part of a larger occupatiional group called Utilities equipment operators and controllers (NOC924). For Utilities equipment operators and controllers, over the period 2015-2024, new job openings are expected to total 12,300, while new job seekers are expected to be available to fill them. As job openings and job seekers are projected to be at relatively similar levels over the 2015-2024 period, it is expected that the balance between labour supply and demand seen in recent years will continue over the projection period.” [Source: Canadian Occupational Projection System, (COPS)].  **Recent or anticipated changes in occupational standards, level of entry and credential and / or standards of accreditation:**   * “Companies often seek candidates with several years of industry-related experience and skills operating and maintaining industrial or municipal water and waste treatment equipment. In Ontario, workers in this profession receive certification and licensing by the Ontario Water Wastewater Certification Office (OWWCO). Prior certifications and experience in occupational safety, supervisory control and data acquisition (SCADA) communications systems, and machinery repair skills is advantageous to becoming a plant operator. Workers who can accommodate a flexible work schedule will be more employable, since water and waste treatment facilities are open 24-hours a day.” (Job Bank) * As operators, the industry needs to continue to develop critical thinking and troubleshooting skills in its employees (MacDonnell, 2018). * Industry needs graduates who are mature, resilient and capable to assume their responsibilities in the industry in the face of the current pace of retirement. (MacDonnell, 2018).   **Resultant Program Changes**:   * consider implementing a mock SCADA system for students to become familiar with the system. (MacDonnell, 2018) * consider segregating from the current curriculum two courses each semester – the first course is a stand alone wet lab course focussing on waste water in the first semester and water treatment in the second semester. The second course is a introduction to water/wastewater math in Sem 1 and applied math and critical thinking in Sem 2. (MacDonnell, 2018). | |

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| 1.2 Graduate Employment & Employment Trends  Review and discuss the following:   * 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. * Emergent employment trends such as new types of positions, changing job market, regional distinctions, changing employer profile, or emerging skill shortages | **Graduate employment statistics (KPI2 and KPI3):**  Overall graduate employment rate for 2017 was 71% (7 respondents) and overall related graduate employment rate for 2017 was 71% (7 respopndents) . There is no 2014-2016 graduate employment data available.  (KPI data tables, Fleming Data Research May 2017)  **Emergent Employment Trends:**  **New types of positions –**   * *(PAC Member, 2018) “(program)* focus tends to have a focus on operations. There are so many other positions in the industry – maintenance, design, engineering, distribution and collection, and management – effect skills in communications, report writing (council reports, etc.) * as the PAC has noted, it is believed that the current pace of retirement will create a need for management and technical skilled positions.   **Regional distinctions**  EMSI Analyst Regional Trend data indicate that for the 2014-2021 period, Durham region is predicted to see a 158% increase in jobs followed by Peterborough with an 87% increase in jobs and Northumberland with a 72% increase in jobs.  **Emerging skill shortages:**   * “Newly automated water and waste treatment productioin systems will need skilled operators who need to learn and be comfortable with engineering and technological changes.” (Government of Canada’s Job Market Report, 2016-2018). * professional develop, specifically realted to management skills (interpersonal, budget, project managemetn, employeed development, discipline etc.) will become increasingly important.   The PAC Curriculum Review surveys(2018) also noted the following tech related skills that graduates need to be effective:   * “Computers, familiarity with SCADA, standard lab equipment (e.g. Spectrophotometer, microscope) * Proficient with office & CMMS understanding * Introductory knowledge on SCADA is useful. * Basic computer skills excel/word. * Computers, tablets” |
| 2.0 Key Performance Indicators  Review and analyze the formal Key Performance Indicator (KPI) results for your program. | Summary of Key Findings |
| 2.1 Student Satisfaction   * In addition to the formal Student Satisfaction KPI results, comment upon any other formal or informal discussions with students and graduates such as *student focus groups*, class councils, class representatives, individuals or delegations, or debriefing sessions following a field placement, clinical placement, or practical work integrated learning experience. | **Student Satisfaction with Learning (KPI 8):**  2014- no data  2015-82% (17 repondents)  2016 – 100% (7 respondents)  2017-83.6% (21 respondents)  (KPI data tables, Fleming Data Research May 2017)  **Student Satisfaction with Teachers (KPI 9):**  2014- no data  2015-90% (17 respondents)  2016-85.7% (7 respondents)  2017-89% (21 respondents)  (KPI data tables, Fleming Data Research May 2017)  **Student input at PAC meeting (March, 2018):**  Four students attended the March 2018 PAC meeting. Their comments are direct quotes and noted below:  Student #1:   * pump (operation and maintenance) * enjoyed confined space safety training – safety harnesses   Student #2:   * pump is a big part of the job – aren’t able to see inside the casing – don’t have a sense of what it’s like underneath the casing * fall protection is really great * broader curriculum than usual training * faculty bring up topics for broader learning and beyond the OIT/Certificate training and cover material beyond to project management, etc.   Student #3:   * SCADA is a large component – a mock SCADA system would be a huge benefit for the program * Lab components – 3 hour sections – a lot of waiting time. Recommend consolidating testing and increased repetition.   Student #4:   * In the beginning – wastewater plant – as we moved on from one module to another it’s easier to understand * The field trips have been beneficial * Difficulty with math but understand it more now   **Student focus groups (March, 2018):**  The student focus was conducted in March 2018. The following are student comments taken from the notes from this sesson.  Strengths/highlights of the program:   * Field trips to water plants and wastewater plants where you can meet people working in the field * Instructors from different fields: engineer, project manager, etc. * Some faculty is more water treatment, some wastewater treatment * Mock interviews and resume feedback was really great. Broad range of career training – project manager prepares you if you were to go into manager * Cover materials across classes * Coordinator really helps the students * The experience and personal field experience (lab, field, engineering), and experts brought in as guest speakers * Labs (e.g. sampling) were helpful to see what actually happens * Students like the modular form – less stressful than the traditional style – material is easier to get through because focus is on one topic only   Variety of teaching methods:   * The only hands on stuff done is in the labs, the rest is lecture style – a lot of people are more tactile learners – bring in an old decommissioned pump to take apart * A lot of videos – better than reading, not as good as practical applications * Textbook purchase – did not really need – recommend a custom course manual (e.g. second semester Stats course pack) that could be sold to students – students use the course manuals way more than textbooks   Evaluation, Assessment and Feedback:   * Students don’t get the tests back – no feedback * A good balance between tests, assignments, etc.   General Suggestions:   * Attendance is not great – 20 of 40 students come to lectures * Group assignments – students who don’t show up to class, sometimes students put into groups and don’t know who one another are – they expect those who are going to class to tell them what to do – some groups you only hear from group-mates 3 hours before assignment is due * Ask students to choose their own group * Liked that in the program did some confined space stuff (e.g. harnesses, gas testing) * It was nice to do OIT here (in Peterborough) * Can we get other certifications: Confined space certification, first aid, WHMIS |
| 2.2 Retention Rate   * Use the IPP (Integrated Program Planning) data that focuses on Retention. * Review patterns of retention on a semester by semester basis over the last five years. * Comment on the effectiveness of any strategies adopted to improve student retention. | **Retention:**  While retention data is only available for 2017, retention is above the College average for the Sem1/Sem2 (AWS 87%) and Sem2/Sem3 (AWS 86%) transitions.  **Strategies to improve retention:**  In light of concrete data, anecdotally the program Coordinator notes that retention is extremely high (on average 95%) across the semester regardless of Sept intake or Jan intake since the program began in 2014. (MacDonnell, 2018). |
| 2.3 Graduate Rate   * Review patterns of graduation rates on a semester by semester basis over the last five years. | **Graduation Rate (KPI1):**  2014-no data  2015-no data  2016-no data  2017-no data  (KPI data tables, Fleming Data Research May 2017) |
| 2.4 Graduate Satisfaction   * Review patterns of graduate satisfaction and provide comment. | **Graduate Satisfaction with Program (KPI11):**  2014- no data  2015-no data  2016-no data  2017- 94% (7 respondents)  (KPI data tables, Fleming Data Research, May 2017)  **Graduate Satisfaction with Learning Outcomes (KPI4):**  2014-no data  2015-no data  2016- no data  2017- 92.6% (5 respondents)  (KPI data tables, Fleming Data Research, May 2017) |
| 2.5 Enrollment Trends and Demand   * Your team will review and analyze the patterns in the number of program applicants, confirmations and actual registrants over the past 5 years. You will also examine changes, if any, in the student demographic profile and the impact, if any, of this changing student profile on program curriculum. * Assess whether the program curriculum needs to change based on the above analysis. * Use the FDR excel spreadsheet that provides Day 10 enrolment numbers for Fleming for the last 10 years, to assist you with your analysis. * Please review the IPP (Integrated Program Planning) data that focuses on trends related to student demand, and the related ‘Situational Analysis’ information included for your program – select the  Demand Trending Tab and Situational Analysis Tab. | Application data indicates 5.5x the number of applicants from 2015 (72 applicants) to 2017 (393 applicants). The increase in applications has translated into increased registrations over the same time period (20, 29, 59 respectfully). The conversion rate has been marginally in decline over the 2015-2017 period, noted at 28%, 18% and 15% conversion rates respectfully.  (AWS Situational Analysis, Fleming Data Research, May 2017)  **Enrollment Trends:**  Fall intakes  Fall 2014- 19 (15 domestic; 3- India; 1 China)  Fall 2015- 17 (16 domestic; 1- Africa)  Fall 2016- 27 (20 domestic; 5- India; 1- Pakistan; 1- Africa)  Fall 2017- 34 (14 domestic; 19- India; 1- China)  (MacDonnell, 2018)  Winter intakes  Winter 2016- 10 (8 domestic; 2 - India)  Winter 2017- 34 (7 domestic; 27- India)  Winter 2018- 50 (5 domestic- 45- India)  (MacDonnell, 2018)  Day 10 tables indicate the following:  Fall 2014 – 20  Fall 2015 – 18  Fall 2016 – 24  While the number for Fall intake have remained relatively constant, what is noteworthy is the change in the domestic and international numbers. The winter intake of 50 students in 2018 has raised many concerns including the following:  “The biggest concern with 50 students, especially in the January start, is the lack of sufficient co-op job opportunities in the industry.  These students will be starting their co-op in September, where at best, we might have 10 jobs available (some of which don't even start until January).  As this is currently a co-op mandatory program, this puts significant pressure on faculty from the students to get jobs.  Also, as this intake is heavily dominated by international students (ratio of 46:4) who have immigration challenges about their co-op; driver's licence issues; and language/culture issues; greatly magnifying the problem” (MacDonnell, 2018).  Over the past two years, especially in the January intake of students, this program has become heavily dominated by international students. For example, this past January, we started out with over 60 students, of which 55 were international.  By second term, we had 49 students, of which 45 were international.  My concern in this matter is two fold- firstly, the large international contingent is making the mandatory co-op placement extremely challenging as the majority of the students do not have a valid Ontario Driver’s Licence and prior work experience in Ontario; and secondly, is the program getting a reputation as being a program designed for international students.  I applaud the journey these young adults make to get to Canada and take the program, but the demographics in class is challenging.  I also wonder if word is getting out about the program being so heavily dominated by international students that domestic students will look elsewhere. (MacDonnell, 2018).  Specific concerns related to the winter 2018 semester include the following:  With the large intake of students, combined with the carryover of students from September (entering semester 2), we have a huge staff shortage of qualified teachers.  Moving forward with courses, next January we will have 10 courses between the two groups.  Based on numbers from last year, it seems that I will likely only be able to teach 2 of them.  This means that 8 courses will be outstanding- internally we have two additional faculty who teach in the program but we are limited on their hours and availability.  I personally believe we need another full-time faculty member in this program” (MacDonnell, 2018). |
| 3.0 Program Curriculum | Summary of Key Findings |
| 3.1 Program Learning Outcomes and/or Sector Standards   * Review program level learning outcomes in preparation for curriculum mapping (vocational, essential employability skills, general education) * Where applicable review sector standards to ensure program is keeping up with new trends, developments and requirements. | Program Learning Outcomes have been reviewed and are considered to be in line with current industry demands.    Advanced Water System Operations and Management PROGRAM CODE: AWS  Program Vocational Learning Outcomes (No Ministry Program Standards)  1 Utilize a wide variety of instrumentation and standardized protocols for the collection and analysis of samples and data required in the operation of water and wastewater facilities  2 Collaborate with individuals, groups in testing and troubleshooting equipment at various water treatment and distribution facilities and at wastewater collection and treatment facilities  3 Evaluate system design and operations based on current legislation, regulations and standards affecting water and wastewater treatment plants, scope and authority of certificates of approval and owner, operator responsibilities  4 Develop risk management strategies including emergency response and disaster preparedness for water and wastewater systems  5 Test and monitor microbiological parameters in water and wastewater applications and propose remediation strategies to reduce, eliminate contaminants  6 Assess current, innovative and emerging technologies in such areas as water conservation, alternative supply (e.g. rainwater) and zero-discharge for the provision of potable water and wastewater treatment and their possible applications within the industry  7 Assess current infrastructures in water operations for ongoing maintenance plans to address future needs and changes in such areas as disaster preparedness, population growth and climate change  8 Manage projects in the maintenance, renewal, and replacement of utility infrastructure using project planning and project management tools. |

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| 3.2 Program of Study, Course Outlines, Delivery and Program Map   * Review the feedback and suggestions received from Course-level survey completed by faculty at the end of each semester. * Review the balance and frequency of assessment types across the curriculum and their appropriateness to learning outcomes for the course and program level outcomes. * Collect a cross section of samples of student work as evidence of achievement of learning outcomes. * Reflect and comment upon the variety of methods used to demonstrate program outcomes. * Reflect and comment upon the degree of technology-enhanced delivery of the program outcomes. * Discuss the degree and depth to which the program is providing work integrated learning experiences. * Discuss the degree and depth to which the program includes Indigenous perspectives and record the courses in the curriculum in which Indigenous perspectives are covered * Record the course in the curriculum that covers the college-wide sustainability learning outcome * Review (or create) Program Curriculum Map(s) to ensure that there is alignment of current courses to the overall program outcomes, including the Vocational Learning Outcomes, the Essential Employability Skills, and adherence to the General Education Policy. * Review pre and co-requisites to ensure that they do not hinder progress in the program, unnecessarily. * Make recommendations to address any gaps identified or improvements required. * Review the program’s current admission requirements and their suitability in relation to program rigour and student preparedness. * Include an updated program curriculum map on your program and curriculum review web page. | Program-level comments: AWSOM started in 2014 with 19 students.  The AWSOM 1 year post graduate certificate was designed as a ‘modular’ program. During the original program development, a number of modules were designed and then packaged together to create a course. Modules are between 10 and 20 days in length and all faculty (10) but one, are part time. This means that some faculty only teach for 1 day/yr and others teach for up to 12 days/year (if they teach more than 1 module). While having industry as faculty is great, there is conflict in scheduling and availability with respect to their responsibility to respond to the demands of their full time jobs. There is some collaboration between faculty teaching modules within a course but largely faculty are teaching at a modular level rather than a course level. This creates some significant challenges for students. For example, it is difficult for the students to understand how all the curriculum fits together, it causes challenges as students have to figure out where droboxes for modules are in D2L and what marks fit together to generate a course mark to name a few. Of the 10 courses, all are modular, averaging 3-4 part time faculty per course with a total of 10 faculty teaching in the program. With no course lead, course outlines, gradebooks and final grades are managed by Coordinator.  **Course-level comments**  **SEMESTER 1:**  **ENVR89 –** this course is noted as requiring major revisions specifically as it moves away from the modular design. Revisions include updating learning outcomes, sequencing, assessment improvements and student resources. (Kraemer, 2018)  **ENVR91 –** this course is noted as requiring major revisions for assessments as it moves away from modular delivery. Minor revisions were noted for adjusting learning outcomes, incorporating GPS technology and some mapping technology, focusing on hydraulics.  **ENVR94**  **ENVR90 –** minor revisions noted for assessments and lab material as this course moves from modular delivery to course delivery. It is noted that it is well sequenced and learning outcomes appear reflective of content.  “It would be advantageous to augment the course material with some of these small systems such as a reverse osmosis drinking water system or a small treatment system with UV lamps, all of which could be used to both illustrate the different components within these types of systems and having them would also lend themselves well to laboratory experiments to help demonstrate how they operate” (Balch, 2018).  **ENVR98 –** major revisions noted for sequencing of material and assessment. **“….** a key focus of this module should be health and safety for working in the Water/Wastewater industry. Also, I would like to incorporate some supervisory skills such as dealing with difficult people and conflict in the workplace in this module. Finally, as this module occurs in the first semester, I would like to incorporate the students writing of their Operator In Training (O.I.T.) exams during this time” (MacDonnell, 2018).  **SEMESTER 2:**  **ENVR97 –** the requested introduction of a demonstration SCADA system and the complete movement away from modular delivery, will result in a major revision with respect to learning outcomes, sequencing, assessment, technology and student learning materials. (MacDonnell, 2018)  **ENVR96 –** as this course moves completely away from modular delivery, major revisions are noted for assessments. Sequencing will require some minor revisions. Student material, learning outcomes and technology are all noted as basically working well. (MacDonnell, 2018)  **ENVR99 –** currently limited input from 1 faculty member who delivers two lectures in this course, who feels that this course is well placed in the semester and offers good perspective on industry innovation. This faculty member sees an opportunity to explore a greater connection to the work being done in the CAWT on campus.  **ENVR92 –** generally this course is noted as working well with revisions to assessments and sequencing as a result of the move away from modules. Technology is more specifically noted as needing upgrading with respect to the following: “We need to look into the purchasing and subsequent licensing agreements for a simulated Water Treatment Plant where the students can control flow, chemical additions, trend data, etc. This will entail the help of external personnel to get the system installed. Typically, we would agree to a fixed number of licenses (i.e. 8 or 10) which means that only this number of users can be logged in at one time. The actual numbers will be determined by the licensing cost structure. This will greatly enhance the students learning experience and I would like to see this implemented by next January (2019)” (MacDonnell, 2018)  **ENVR95**  **SEMESTER 3:**  **APST125**  **APST126**  **Balance and frequency of assessments:**   * Across the program, assessments are considered to be generally well balanced * There has been concern with the modular delivery, because there is not enough time for students to comprehend the content and then do the work. Another reason to move away from modular delivery. * There are 4 assessments per module on average * Assessments include, exams, labs, written assignments, presentations, and research projects * The more practical applications occur in the lab   **Work integrated learning experiences:**   * 4 month Co-op, currently mandatory but need to re-evaluate this mandatory requirement. * Presentation on the students’ experience of Co-op * Work shadowing – 2 days   **Indigenous Perspectives:**   * integration of Indigenous perspectives is identified as limited in AWS * currently discussed in ENVR89 Human Population: Water and the Environment wrt Water Quality on First Nations Reserves in Ontario. * this is a post-grad program so there is no opportunity for students to access Gen Eds that focus on Indigenous Perspectives   Sustainability learning outcome :  “Students will be able to explain the interconnections between the broad principles of sustainability - which include human health and well-being, ecological health, social issues, and secure livelihoods- in order to support a better world for all generations.”  (https://flemingcollege.ca/PDF/Sustainability/AssessingTheSustainabilityLearningOutcome\_June2016.pdf)  The AWS courses that currently contribute to meeting the Sustainability outcome above are as follows:  ENVR 99- Innovation in Water/Wastewater Management                  ENVR 94- Physical and Biological Removal Processes                  ENVR 89- Human Population, Water and the Environment  **Admission Requirements:**   * Undergraduate degree or Ontario College diploma in an environmental or related sciences or technology related field. * Applicants with relevant professional experience who do not meet the admission requirements may be considered on an individual basis (it is noted, that this entrance pathway needs to be reviewed. See Program Improvement Plan) |
| 4.0 Strategic Positioning and New Opportunities | Summary of Key Findings |
| 4.1 College and School Alignment   * Review program alignment with college priorities such as vision, mission, values, strategic plan, academic plan and the educational mandate, and / or academic priorities of the School. * Review program webpage and promotional messaging to ensure accuracy and currency. | **Program Alignment with College Vision and Values:**    The AWS program is aligned with the current College Vision: “More than Skills. Fleming will be known for our continuous pursuit of excellence in teaching and every endeavor”; and College Values: “Learning, Collaboration, Creativity, Continuous Improvement, Sustainability, and Inclusiveness” (Fleming College Strategic Plan, 2015-2018, p. 2).    The AWS program reflects the College vision by continuously striving to challenge its students through engaging learning opportunities, such as Field trips to water plants and wastewater plants where students meet people working in the field and see first hand work they may be doing in the field.    **Program Alignment with Academic Priorities:**    Specifically the AWS program reflects the following Academic priorities:    “Learning Design: Reimagine and design learning opportunities to fully engage our students using accessible outcomes-based approaches, applied learning and authentic assessment. Connection to the Strategic Plan: Priority #1 Deliver outstanding student learning and experiences, and Priority #2 Collaborate and prosper with our communities” (Fleming College Academic Plan, 2015 – 2018, pp. 10 – 11).    The AWS program demonstrates this in its commitment to progressive, current and applied learning through many hands on, real world experiences that are directly reflective of the work they will be doing in the field. The Co-op component of this program ensures fully engaged students who receive observable evidence of the impacts of their efforts.    “Teaching Excellence: Promote and recognize innovation and excellence in teaching by supporting and engaging faculty in industry practices, discipline research, and educational technology. Connection to the Strategic Plan: Priority #1 Deliver outstanding student learning and experiences, Priority #2 Collaborate and prosper with our communities, and Priority #3 Excel as an organization” (Fleming College Academic Plan, 2015 – 2018, p. 12).    Fleming faculty members are committed, energetic, and creative people who want to contribute to the future of education. |
| 4.2 Competitor Programs   * Analyze key parallels and differences between this program and those of its closest competitors, where applicable. * Comment on the ’Value-added’ program distinctions and their attractiveness to prospective students. | **Competitor Programs:**  As this is a post grad certificate program that focuses on both operations and management aspects of the industry, there is no direct competition from other colleges in Ontario. However, there are several diploma programs that focus on the Water/Wastewater industry including Durham College, Fanshawe College, Northern College (Kirkland Lake Campus), Loyalist College, Georgian College, and Lambton College (plus others).  Lambton College offers a two year technician diploma (working in conjunction with Northern College) in Water/Wasterwater Treatment. This program incorporates the writing of their Level 1 Exams (as does AWSOM), and, along with three co-op work terms is promoting students will graduate with a class 1 licence. Based on this fact plus it’s specificity on water/wastewater treatment and not a general ET type program, is potentially our biggest competition. That being said, as a post grad program, our grads generally have the advantage of previous education and maturity that makes them unique. Finally, it is only a one year program and not 3 years. |
| 4.3 Learning Pathways   * Comment on recent or anticipated initiatives that promote student pathways including secondary school partnerships, dual credits, program laddering, dual diplomas, and university transfer, articulations, and partnerships. * Review all transfer credits. * Identify any new pathways that could be developed. | Currently there are no colleges and universities with pathways to or from Fleming’s Advanced Water Systems Operations and Management Co-op. AWSOM is a Graduate studies program and as such students need to have completed an Undergraduate degree or equivalent to apply.  **New Pathways:**  None noted at time of writing. |
| 4.4 New Program or Redesign Ideas   * Are there opportunities for new program initiatives based on Program, School, or community strengths and alliances? | **New Program/redesign ideas:**   * will move from modular delivery to 13 week course delivery for Sept 2018 intake. * consider development of a Graduate studies program focused on Environmental and Industrial Management. * development of external management courses for Water/wastewater Industry professionals |
| 5.0 External Relations | Summary of Key Findings |
| 5.1 Community Partnerships   * Does your program have significant partnerships, relationships, connections, or offers of support from the community that help to enrich the program and the student experience? * Are faculty, staff, and student involved in volunteer projects and events? | Yes, the AWS program has significant partnerships as follows:   * industry guest speakers * Co-op Placement hosts * Job shadowing opportunities   College should have a student chapter for OWWA and WEAO and students in AWSOM could take the lead in creating this. |
| 5.2 Program Advisory Committee   * Comment on the distribution of Committee membership by constituency, sector, and / or region. * Comment on the vitality of the Committee (frequency of meetings, members’ level of participation, engagement, and turnover.) | AWS PAC currently consists of 10 external members. Of this 10, 7-8 would be considered to be active.    **Current member profiles:**   * 1 member represents MOECC * 1 member represents Engineering/consulting * 2 members represent Water Treatment/Distribution * 2 members represent Wastewater Treatment/collection * 1 member represents laboratory services * 1 member represents training and development * 1 member represents public works and/or municipal engineering * 1 member is needed to represent instrumentation/SCADA programing   **Vitality:**  The actively engaged members make significant contributions and observations during the annual PAC meeting. Aside from sitting on the annual PAC meetings, members can contribute by teaching a course (if feasible), assisting with guest lectures, demonstrations, equipment and materials donations, etc. |
| 5.3 Alumni Relations   * Describe the type and range of alumnae involvement in the program. * Current and future strategies to engage alumnae in the program. | **Alumni Relations:**  There is a range of alumnae involvement in the program. Currently there are 2 graduates from the program actively involved in assisting with development and teaching of modules.  Because they have been through the program, they have the advantage of knowing the learning expectations for the courses/modules.  On the downside, as this program is only in its fourth year, they do not have a lot of direct experience in the field, but have proven themselves to be excellent teachers.  In the future, I would like to get a grad on our PAC- but, again, they will need some more experience. |
| 6.0 Program Resources | Summary of Key Findings |
| 6.1 Program Revenue and Expenses   * Please review Integrated Program Planning (IPP) information for your program. * Are program resources adequate, in the context of program currency and student numbers? (e.g. laboratory equipment, software, library holdings, or tools essential to program delivery and student learning. * Are there opportunities for further program specific external revenue such as sponsorship, grants, donations or gifts-in-kind? * Review the existing revenue and expenses associated with your program using the IPP tool and provide comments below. * Review all textbooks for cost, format (hard-copy, e-book, rental), use in multiple semesters, content (curriculum alignment, Canadian content, readability, engagement level), ancillary materials (question bank, Powerpoint, online support, image bank), publisher support, AODA compliance, and conflict of interest. | cid:image008.png@01D39F4B.0B8BEF00  **Program Resources:**   * are deemed to be adequate for a class of 35.   **Opportunities for External Revenue:**   * Consider the development of external management courses. This was initiated in Summer 2017 and then retracted due to labour negotiations. There is a demand in the Industry for this type of training.   **Revenue and Expenses:**   * the contribution margin shows strong growth over the 2015 to 2016 years * it is anticipated that 2017 will be even stronger due to the additional cohort of international students   **Textbooks:**   * No course relies on a single text * Predominately use ppt and handout material – this is currently working well. |
| 6.2 Faculty and Staff Resources  Please comment on:   * 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 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. * Hiring priorities over the next few years based on the above. | **Program Staffing:**  Current staffing structure:  One full time faculty  Three part time faculty  An estimated 10 contracted instructors  One part time technician – currently 10 hours/week: would like to see 15 hours/week with an intake of 30 students. Suggest 20/week if numbers reach 40 students  **Faculty Profiles:**  Full time faculty:   * Education: BSc. and P.Eng * Specialty: Environmental Engineering * Experience: 20+ years of water/wastewater operational and management * Volunteer: OWWA Education Certification Committee Member   Part time faculty:   * Education: Ph.D. Biology * Specialty: Toxicology; research and development for emerging wastewater and drinking water technologies   Part time faculty:   * Education: Ph.D. Ecotoxicology * Specialty: Contaminants in aquatic ecosystems   Part-time Technicican:   * currently slated for 10 hours per week.   **Hiring Priority:**   * One full time Faculty member for Jan 2019 * Additional hours for the Technician: suggest 15 hours/week with an intake of 25 students and 20/week if numbers reach 40 students |
| 6.3 Program Delivery Capital Assets   * Please review existing program space and equipment * Determine needs for space and equipment to fulfill future needs | * “Supervisory Control and Data Acquisition (SCADA) is the operational system for Water and Wastewater systems. “Moving forward, I would like to get the college to purchase a demo SCADA system for the students to use and learn from” (MacDonnell, 2018) * “We need to look into the purchasing and subsequent licensing agreements for a simulated Water Treatment Plant where the students can control flow, chemical additions, trend data, etc. This will entail the help of external personnel to get the system installed. Typically we would agree to a fixed number of licenses (i.e. 8 or 10) which means that only this number of users can be logged in at one time. The actual numbers will be determined by the licensing cost structure. This will greatly enhance the students learning experience and I would like to see this implemented by next January (2019)” (MacDonnell, 2018). * “It would be advantageous to augment the course material with some of these small systems such as a reverse osmosis drinking water system or a small treatment system with UV lamps, all of which could be used to both illustrate the different components within these types of systems and having them would also lend themselves well to laboratory experiments to help demonstrate how they operate” (Balch, 2018). |

**Program Improvement Plan**

Based on the analysis of your key findings, identify areas that require attention and action in the next 1-3 year timeframe. Ensure that you only recommend actions that reflect the program’s priorities and its capacity to achieve them, and record the success of any changes implemented and the means by which they are being evaluated.

To make sure your goals are clear and reachable, each one should be:

* **S**pecific (simple, sensible, significant).
* **M**easurable (meaningful, motivating).
* **A**chievable (agreed, attainable).
* **R**elevant (reasonable, realistic and resourced, results-based).
* **T**ime bound (time-based, time limited, time/cost limited, timely, time-sensitive).

|  |  |  |  |
| --- | --- | --- | --- |
| New Recommended Improvements | Timeframe | Person(s) Responsible | Approval: Dean, Chair, or VPA or  Not Feasible, with rationale |
| 1. Purchase simulated Water Treatment Plant for SCADA.  * Rationale: “Supervisory Control and Data Acquisition (SCADA) is the operational system for Water and Wastewater systems. “Moving forward, I would like to get the college to purchase a demo SCADA system for the students to use and learn from” (MacDonnell, 2018) * “We need to look into the purchasing and subsequent licensing agreements for a simulated Water Treatment Plant where the students can control flow, chemical additions, trend data, etc. This will entail the help of external personnel to get the system installed. Typically we would agree to a fixed number of licenses (i.e. 8 or 10) which means that only this number of users can be logged in at one time. The actual numbers will be determined by the licensing cost structure. This will greatly enhance the students learning experience and I would like to see this implemented by next January (2019)” (MacDonnell, 2018). * There is perhaps potential to share the SCADA system with the Aquaculture program | January 2020 | Graham Nasby  Ken MacDonnell |  |
| 1. Review of co-op as a requirement. The academic portion of the program meets the required learning outcomes for co-op as well. Furthermore, there is a challenge with obtaining the sufficient jobs for the students in the program. Co-op is still recommended although with suggested limits as follows (based on historical numbers) Fall enrollment- 25 co-op spots; Winter enrollment- 10 co-op spots. | Implementation for the start of fall semester in 2019 | Rick Gray  Brett Goodwin  Ken MacDonnell |  |
| 1. Change program courses to include 2 new courses- a separate lab course and a math course in each semester.  * The addition of an individual lab course will provide students with the opportunity to attain Water Quality Analyst designation * The addition of an individual math course will ensure students understand and can apply required math skills to meet industry expectations * The total program hours will not change, but will be re-distributed to meet the new course structure | September 2019 | Ken MacDonnell  Rick Gray |  |
| Previous Recommended Improvements | Timeframe | Person(s) Responsible | Update and Rationale: Proceeding = P  Completed = C  Not Feasible = NF |
| 1. Change from a Modular design program to a traditional course program where each course will last the full term (15 academic weeks). Estimate this to be 30 hrs for each course (2.5 hours/week for 12 weeks). There are 5 courses that require the re-work.  * note: this will include movement from 13 weeks to 15 week program. | Fall 2018 | ENVR 89- Human Population, Water and the Environment-  ENVR 90- Small Water / Wastewater Treatment Systems  ENVR 91- Infrastructure Management  ENVR 94- Physical and Biological Processes; Large WWT  ENVR 98- Co-op Preparation |  |
| 1. Consider discussion of one full time Faculty Hire if no hard cap for Fall and Winter intakes. If a hard cap is set, perhaps full time faculty not required. Caps suggested are Fall intake of 25 and Winter intake of 25 |  |  |  |
| 1. Applicants with relevant professional experience who do not meet the admission requirements may be considered on an individual basis. – update on website    * Update web page to reflect the reality that this is not occurring and needs to have further discussions | Fall 2019 | Ken MacDonnell |  |
| 1. Currently 1 part time technician – currently 10 hours/week: would like to see 15 hours/week with an intake of 25 students. Suggest 20/week if numbers reach 40 students | Fall 2018 |  |  |