**Sinclair Community College**

**Continuous Improvement Annual Update 2017-18**

**Please submit to your Division Assessment Coordinator / Learning Liaison for feedback no later than March 1, 2018**

**After receiving feedback from your Division Assessment Coordinator, please revise accordingly and make the final submission to your dean and the Provost’s Office no later than May 1, 2018**

**Department:** **SME - 0551-Mechanical Engineering / 0552-Heating, Air Conditioning, & Refrigeration / 0542-Energy Management Technology**

Year of Last Program Review: FY 2016-2017

Year of Next Program Review: FY 2021-2022

**Section I: Progress Since the Most Recent Review**

Below are the goals from Section IV part E of your last Program Review Self-Study. Describe progress or changes made toward meeting each goal over the last year. Responses from the previous year’s Annual Update are included, if there have been no changes to report then no changes to the response are necessary.

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| **GOALS** | **Status** | **Progress or Rationale for No Longer Applicable** |
| **Energy Management Technology**  Increase exposure of program and state of the art lab. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department has hired a part-time program coordinator to help manage outreach activities ranging from social media marketing to high school career fairs. The coordinator also arranges student visits to campus and tours of the department’s classroom and labs. |
| **Energy Management Technology**  Develop online courses. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: Professor Bob Gilbert is currently working on developing an online offering of EGV1101 Alternate & Renewable Energy Sources. |
| **Energy Management Technology**  Increase number of advisory board participants. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department is working to invite and secure commitments by industry leaders to join the Energy Management Technology advisory board. |
| **HVAC-R Engineering Technology**  Work with industry to increase awareness of program. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department has hired a part-time program coordinator to help manage outreach activities ranging from social media marketing to high school career fairs. The coordinator also arranges student visits to campus and tours of the department’s classroom and labs. The department has also been working directly with local businesses to advertise the program. |
| **HVAC-R Engineering Technology**  Move the sheet metal lab to Building 5 as part of the Health Sciences backfill strategy. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The President’s office was made aware of the desire to move the Eaker Street sheet metal lab to the basement of Building 5. The department is waiting for word; the G4 project is currently taking most facility resources. |
| **Mechanical Engineering Technology**  Finalize Additive Manufacturing Short Term Certificate. | In progress 🞏    Completed X  No longer applicable 🞏 | 2017/18 Update: The department finalized the Additive Design Specialist short term certificate. The certificate is 7-8 credit hours depending on the 3D modeling software course selected. |
| **Mechanical Engineering Technology**  Finalize curriculum for two new additive manufacturing courses. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: Two classes have been developed in additive manufacturing: MET1401 Additive Design & Printing and MET1431 Additive Manufacturing Post Process. Content continues to be refined as the courses are offered. |
| **Mechanical Engineering Technology**  Reaffirm articulation with University of Dayton. | In progress 🞏    Completed X  No longer applicable 🞏 | 2017/18 Update: The University of Dayton has maintained its Mechanical Engineering Technology offering. Students at Sinclair are encouraged to enter the UD/Sinclair Academy for maximum benefits. |

Below are the Recommendations for Action made by the review team. Describe the progress or changes made toward meeting each recommendation over the last year. Responses from the previous year’s Annual Update are included, if there have been no changes to report then no changes to the response are necessary.

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| **RECOMMENDATIONS** | **Status** | **Progress or Rationale for No Longer Applicable** |
| What can this department do to get the word out about the exciting things it is doing? While many on campus may be aware of the Guitar Lab, there are other activities that are less well-known. For example, the cutting-edge quality of the labs, the attention-grabbing Multi-disciplinary Capstone projects, and other remarkable assets of the department are not widely known, even by other departments on campus. Several members of the Review Team heard about these things for the first time during the discussion with the department. More people need to know about what the department is doing – because there are a lot of things that would attract students and that should be capitalized on in our marketing efforts. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department has been working to create department awareness through activities like a department open house, participating in Engineers Day, attending career fairs, and meeting with advisors. The department is currently reviewing its web pages and collateral materials as well as working with marketing to develop short videos. |
| The department is moving towards use of social media to increase awareness of its programs. The department is strongly encouraged to continue these efforts. The department chairperson is strongly encouraged to meet with the Manager of the Student Enrollment Center to discuss building a social media strategy to increase the visibility of the department’s activities and attract more students to its programs. The use of videos is a promising approach to market the program – for example, when the chassis that the department has designed is used in racing, it should be captured in video form and shared online. The department has a number of “success stories” of graduates that could be used to attract new students that should also be utilized. Recent online videos produced by the College have attracted a great deal of positive attention, and the department is encouraged to utilize this approach. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department has recently hired a part-time program coordinator who has been tasked with creating and maintaining social media (with marketing approval). The program coordinator is currently working with Denny Wilson. |
| Similarly, the department webpage should be used to showcase some of the impressive activities the department is engaged in (e.g. the guitar lab, the superb lab facilities, the Multi-disciplinary Capstone projects, etc). | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department is working to create content on the respective program web pages to showcase student work, labs and facilities. The departments newly hired part-time program coordinator has been tasked with working with Marketing to produce short video clips and testimonials. |
| The department is strongly encouraged to develop a strategy to reclaim enrollment from for-profit competitors. These efforts should include a direct comparison of costs of Sinclair programs with those of for-profit competitors, perhaps in the form of a flyer, and certainly available electronically. However, the department should also highlight the other benefits to enrolling in Sinclair’s programs relative to for-profit institutions, because price is not the determining factor for all students. The fact that Sinclair offers the only commercial HVAC program in the area should be strongly emphasized. Perhaps specific groups should be targeted for recruitment in these efforts. For example, how can displaced workers be attracted to Sinclair’s programs over others in the area? | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department is regularly reviewing transcripts of now defunct for-profit schools as it welcomes in students from these programs. The department is also reviewing articulation agreements with partner universities. |
| On a related note, the department is strongly encouraged to push forward with its efforts to build a cohort-based two-semester model for HVAC certificate completion. This effort should be based on a strong marketing approach that ensures a sufficient number of students are recruited to make sure the courses for the cohort run. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department is working to increase enrollment in all programs as a whole. The department will be participating in the certificate / job fair in June 2018 to highlight its certificate and short-term certificate offerings. |

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| The department is also strongly encouraged to continue development of the virtual labs it has already spearheaded, and to also explore development of mobile labs that would allow for course offerings at remote locations. Perhaps an economically feasible means could be found for a mobile lab to be available at Courseview one term, and then at the Preble Learning Center the next, for example. The department should determine the cost of such an approach, and determine the enrollment that would be required to offset those costs. The Budget Office should be utilized in making this analysis. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department is working with marketing to develop short videos that can be used as a basis for the virtual lab on its webpages and as a looping video at outreach events. |
| There is already some curricular synergy between the HVAC-R and Energy Management programs – can certificate programs from each be marketed to graduates of the other as a means of providing additional skill sets and increasing earning potential? Is there the potential for development of a hybrid program that combines elements of both programs? | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department has planned a review of all programs for the upcoming academic year, including degrees, certificates, and short-term certificates and is tasked to identify opportunities to collaborate between programs. |

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| Does the department have a strategic plan for activities it will prioritize in the coming years to better meet student and local industry needs? The department is encouraged to develop a brief but specific plan outlining activities over the next 5-10 years. | In progress X    Completed 🞏  No longer applicable 🞏 | 2017/18 Update: The department is currently developing its outreach and marketing plan including venues it wishes to entertain. This is being done with advisory board input and guidance. |

**Section II: Assessment of General Education & Degree Program Outcomes**

For the FY 2016-17 Annual Update, departments are asked to provide assessment results for **Information Literacy**.

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| **General Education Outcomes** | Year assessed or to be assessed. | Course identified by the department where this outcome could be assessed | Assessment Methods  Used | What were the assessment results?  (Please provide brief summary data) |
| **THIS YEAR’S ASSESSMENT RESULTS** |  |  |  |  |
| Computer Literacy | **2017-2018** | **Mechanical:**  **MET 2780**  **MET1131**  **Energy:**  **EGV 2781**  **HVAC-R:**  **HVA 2780**  **MET1131** | MET2780:  Advisory board surveys at department’s annual dinner and expo.  MET1131:  Excel, PowerPoint, Software Quiz, Word | 2017/18 Mechanical Update:  The single student in the outcome rubric exceeded expectations (90% or better) for Excel, PowerPoint, and Word. The student did not meet expectations (70% or better) for the software quiz.  2017/18 Energy:  No data collected.  2017/18 HVAC-R Update:  100% of three students exceeded expectations (90% or better) for Excel, PowerPoint, and Word. One out of the 3 students in the survey did not meet expectations (70% or better) for the software quiz. |

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| **LAST YEAR’S ASSESSMENT RESULTS** |  |  |  |  |
| Information Literacy | **2016-2017** | **MET 2780**  **EGV 2781**  **HVA 2780** | Advisory board surveys at department’s annual dinner and expo. | 2017 Update: According to aggregated data tabulated by RAR, the department’s annual Capstone Expo, attendees rated the performance of students an average of 8.33 on a 9 point Likert scale.  According to aggregated data tabulated by RAR, the department’s annual Capstone Expo, attendees rated the performance of students an average of 8 on a 9 point Likert scale. |

The Program Outcomes for the degrees are listed below. Responses from previous years are provided below. **All program outcomes must be assessed at least once during the 5 year Program Review cycle, and assessment of program outcomes must occur each year**.

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| **Energy Management Technology  Program Outcomes** | **To which course(s) is this program outcome related?** | **Year assessed or to be assessed.** | **Assessment Methods**  **Used** | **What were the assessment results?**  **(Please provide brief summary data)** |
| Apply fundamental technical principles to evaluation of energy systems. | HVA 1261 HVA 1201 HVA 1221 MAT 1280 MAT 1290 EGV 1301 EGV 2780 PHY 1131 | 2017 | Capstone final project. | 2017 Update: There were no capstone students in Energy Management in 2017. |
| With knowledge of building envelope, building mechanical & building electrical systems, perform an energy audit & prepare a complete report with recommendations for savings opportunities. | HVA 1201 HVA 1221 HVA 1351 CAT 1111  EET 1120 EGV 1201 EGV 1301 EGV 1351 EGV 2201 EGV 2251 EGV 2301 HVA 1261 | 2016 | Capstone final project. | Student success rates equaled 100%. Client success rates also equaled 100%.  Students wrote 10 reports. Clients included Montgomery County, Sinclair Community College and a few local school district buildings.  Overall, students recommended practices that would save these clients over $200,000 yearly in energy consumption. This represents a 16% savings on their current energy usage.  The clients were happy with their work and commented that the reports were both professional in display and readable. |
| Demonstrate professionalism through ethical behavior, demonstrating sensitivity to individuals of other cultures, & conveying a global perspective on energy issues. | OTM: Arts & Humanities Elective OTM: Social & Behavioral Sciences Elective MET 2711 | 2015 | Challenger case and KC Skywalk case w/ written rubrics for Professionalism  NSPE Ethics quiz for ethical responsibilities  Diversity, Risky Tank case w/written rubric | Challenger Case:  Average score: 91.1% (spring) 100% (fall)  Students achieving 70% threshold:  90% (spring) 100% (fall)  KC Skywalk Case:  Average score: 81.3% (spring) 82% (fall)  Students achieving 70% threshold:  90% (spring) 100% (fall)  NSPE Ethics Quiz  Average score: 82.6% (spring) 84% (fall)  Students achieving 70% threshold:  91% (spring) 100% (fall)  Risky Tank (Diversity:  Average score: 72.4% (spring) 91.2% (fall)  Students achieving 70% threshold:  64% (spring) 100% (fall) |

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| Develop an energy management plan. | EGV 1251 EGV 1301 EGV 2780 | 2017 | Capstone final project. | 2017 Update: There were no capstone students in Energy Management in 2017. |
| Assess a site for the use of renewable energy technologies & prepare a proposal for installation, taking into account applicable codes, & standards, utility rate structures, economics & safety. | EGV 1101 EGV 1251 EGV 1301 EGV 2101  EGV 2151 EGV 2780 | 2018 |  |  |
| Effectively communicate technical information. | COM 2211 MET 1131 ENG 1101 | 2015 | Oral communication: real world ethics case presentation graded by rubric  Written communication, final case graded by rubric | Real world ethics case oral presentation: Average score: 87.6% (spring) 95.3% (fall)  Students achieving 70% threshold:  91% (spring) 100% (fall)  Final ethics case: Average score: 84% (spring) 88.2% (fall)  Students achieving 91% threshold:  100% (spring) 100% (fall) |

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| **HVAC-R Engineering Technology**  **Program Outcomes** | **To which course(s) is this program outcome related?** | **Year assessed or to be assessed.** | **Assessment Methods**  **Used** | **What were the assessment results?**  **(Please provide brief summary data)** |
| Demonstrate an in-depth understanding of the troubleshooting, commissioning, design and documentation processes for commercial HVACR systems and subsystems via the application of industry accepted techniques, methods, and tools including but not limited to handbooks, manuals, codes and software. | EET1120  EET1139  HVA 2780 HVA Elective  HVA1201  HVA1221  HVA1241  HVA1301  HVA1351  HVA1401  HVA2251  HVA2351 | 2014-15 | Assessment of capstone. | Feedback from industry led advisory board members showed favorable opinions of the educational achievements of capstone students.  2016: Results / Actions:  Spring 2016  Midterm Scores:3.14/4.0 with 7 respondents  Midterm Comments: 3 of 7 respondents provided comment    At this stage of development, team is moving in right direction    Needs further understanding of the commissioning process    All students are ahead of where I thought they would be at this point  Actions: Although not indicated in written comments, verbal comments requires I stress the functional testing of all major equipment  Final Scores: 3.73/4.0 with 11 respondents  Final Comments  6 of 11 respondents provided comment    Excellent job working through the bumps in the road. “Real World”.    Started from scratch and pulled off a great project    It was great to see how far the HVAC program has come in the last five years. Hands-on experience is key to success    This is really a first class learning experience. The students really leaned.    Both fortunate and unfortunate that there were few students and a system was in disrepair. Taught commissioning and self-reliance    This is a real world project and it looks like the students are ready for the real world  Required Action: No action is currently required. However, I will continue to develop commissioning experience with proper documentation. Irrespective of advisory’s satisfaction, I believe it needs to be taken to the next level. |

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| Communicate effectively in a technical environment, including written and oral communication, effective listening and technical presentation. | CAT1111  ENG1101 COM2211 MET1131  MET2711 | 2015 | Oral communication: real-world ethics case presentation graded by rubric  Written communication, final case graded by rubric | Real-world ethics case oral presentation: Average score: 87.6% (spring) 95.3% (fall)  Students achieving 70% threshold:  91% (spring) 100% (fall)  Final ethics case: Average score: 84% (spring) 88.2% (fall)  Students achieving 91% threshold:  100% (spring) 100% (fall) |

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| Recognize professional, ethical and societal responsibilities, respect diversity and commit to lifelong learning. | HVA Elective  MET2711  OTM Social & Behavioral Sciences | 2015-16 | Assessment of capstone.  Graduate exit interviews.  Employer surveys.  Co-op feedback.  Challenger case and KC Skywalk case w/ written rubrics for Professionalism  NSPE Ethics quiz for ethical responsibilities  Diversity, Risky Tank case w/written rubric | Advisory board members had favorable evaluations of students.  Many students interviewed expressed intent to continue on to a baccalaureate degree.  Challenger Case:  Average score: 91.1% (spring) 100% (fall)  Students achieving 70% threshold:  90% (spring) 100% (fall)  KC Skywalk Case:  Average score: 81.3% (spring) 82% (fall)  Students achieving 70% threshold:  90% (spring) 100% (fall)  NSPE Ethics Quiz  Average score: 82.6% (spring) 84% (fall)  Students achieving 70% threshold:  91% (spring) 100% (fall)  Risky Tank (Diversity:  Average score: 72.4% (spring) 91.2% (fall)  Students achieving 70% threshold:  64% (spring) 100% (fall) |
| Apply principles of mathematics, physics, chemistry, thermodynamics, psychrometrics and fluid mechanics to HVACR systems. | CAT1131  EET1120  HVA1301  HVA1351  MET1580  PHY1141 | 2012-13 | Assessment of capstone.  Placement testing results.  Locally developed tests and quizzes. | Students are generally underprepared to enter the program mathematically and often start in DEV courses or courses below the required math sequence.  One strong point of our program is incorporating real world problems and solutions into the curriculum.  Students tend to have a better success rate and material retention when the physical sciences are related to their chosen topic of study. |
| Apply principles of environmental safety and health to HVACR system operation, maintenance, troubleshooting and design. | HVA 1201 HVA 2251 HVA 2351  HVA 1301  HVA Elective | 2013-14 | Locally developed tests and quizzes.  Lab observations. | Students have a low rate of injury in the lab. Student to teacher ratios are kept to a manageable number. |

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| **Mechanical Engineering Technology Program Outcomes** | **To which course(s) is this program outcome related?** | **Year assessed or to be assessed.** | **Assessment Methods**  **Used** | **What were the assessment results?**  **(Please provide brief summary data)** |
| Use mathematical and scientific skills to analyze product properties including form, function, fit, strength, thermal and fluid properties, etc. | MET1111  MET1161  MET1231  MET1241  MET1281  MET1301  MET2151  MET2201  MET2251  MET2301  MET2351  MET2401  MET2780  CAM1109 | 2014 15 | Assessment of capstone.  Strength of Materials Highway sign project and presentation. | Feedback from industry led advisory board members showed favorable opinions of the educational achievements of capstone students.  2016: 70% of the students successfully determined wind speed and loads using fluid dynamic equations utilizing local/federal codes, calculated maximum principal stresses and location where it occurred, and used the maximum stresses to design appropriate supporting structures and cross sectional geometries. |

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| Recognize professional ethical and societal responsibilities, respect diversity and demonstrate a commitment to lifelong learning. | MET1231  MET1281  MET2711  MET2780 | 2015 | Challenger case and KC Skywalk case w/ written rubrics for Professionalism  NSPE Ethics quiz for ethical responsibilities  Diversity, Risky Tank case w/written rubric  Trademark Copyright Case | 2016:  Challenger Case:  Average score: 91.1% (spring) 100% (fall)  Students achieving 70% threshold:  90% (spring) 100% (fall)  KC Skywalk Case:  Average score: 81.3% (spring) 82% (fall)  Students achieving 70% threshold:  90% (spring) 100% (fall)  NSPE Ethics Quiz  Average score: 82.6% (spring) 84% (fall)  Students achieving 70% threshold:  91% (spring) 100% (fall)  Risky Tank (Diversity:  Average score: 72.4% (spring) 91.2% (fall)  Students achieving 70% threshold:  64% (spring) 100% (fall)  The FTF section had 100% successful completion.  In the online section 70% of the students successfully completed the assignment. |

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| Design in detail individual parts from functional sketches provided by an engineer, and model them using a three dimensional parametric modeler. (i.e. 3 D CAD) | MET1231  MET1281  MET2711  MET2780 | 2015 16 | Assessment of capstone.  Graduate exit interviews.  Employer surveys.  Co-op feedback.  SolidWorks Technical Report | Advisory board members had favorable evaluations of students.  The department was able to secure capital funding to purchase a newer 3D printer. Additional curriculum is being designed to utilize its advanced features.  2016: 70% of the students successfully complete the Assignment  Students met the assessment with a 70% completion average.  70% of the capstone students successfully complete the tasks listed under “Description of Points Assessed”. |

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| As an interdisciplinary team member, develop products, processes, solve problems, perform project planning, prepare time estimates and make sound ethical decisions. | MET1231  MET1241  MET1301  MET2780 | 2015 2016 | Assessment of capstone.  Graduate exit interviews.  Employer surveys.  Co-op feedback.  Strength of Materials Highway Sign Project | Advisory board members had favorable evaluations of students.  Students in the capstone course have worked with outside industry partners. Evaluations from those partners were also favorable.  Exit interviews indicate that students liked working with industry partners on real projects.  2016: 70% of the students successfully evaluated codes, established design objectives, designed the appropriate supporting structure, and evaluated their design for safety by calculating safety factors in a team environment.  70% of the students successfully complete the tasks listed under “Description of Points Assessed”. |

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| Communicate effectively orally, in writing and graphically on an interdisciplinary team as a design technician using appropriate tools | MET1231  MET1241  MET1281  MET2711  MET2780 | 2015 | Oral communication: real world ethics case presentation graded by rubric  Written communication, final case graded by rubric  Strength of Materials Highway Sign Project | Real world ethics case oral presentation: Average score: 87.6% (spring) 95.3% (fall)  Students achieving 70% threshold:  91% (spring) 100% (fall)  Final ethics case: Average score: 84% (spring) 88.2% (fall)  Students achieving 91% threshold:  100% (spring) 100% (fall)  2016: 70% of the students successfully communicated their results and calculation during the semester and at the end of the semester using CAD models, Power Point presentations, tables and graphs using Excel, and written reports. |

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| Document the product/process model using appropriate means (multi view drawings, pictorials, catalog/manual illustrations, charts/graphs, shaded image, animation, etc.) | MET1231  MET1241  MET1281  MET1301  MET2780 | 2013 14 | Locally developed tests and quizzes.  Lab observations.  Candy Dispenser Project | Students have a low rate of injury in the lab. Student to teacher ratios are kept to a manageable number.  2016: The FTF section had 80% successful completion of a 70% or better score on the project.  In the online section 66% of the students successfully completed the assignment with a score of 70% or better. 3 of the online students ran out of time in getting the assignments in. This contributed to the lower percentage score. 4 out of 4 of the successful completers of the course finished the project successfully. |

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| **Are changes planned as a result of the assessment of program outcomes? If so, what are those changes?** |  |
| **How will you determine whether those changes had an impact?** |  |

**OPTIONAL:**

Please use the space below to keep track of any annual data that your department wishes to maintain. This section is completely optional and will not be reviewed by the Division Assessment Coordinators.

1. Program Educational Objectives (PEO’s) and Program Outcomes last approved by Advisory Board on 3 November 2017.
2. Prerequisite check completed and changes input to CMT in December 2017.
3. Website changes verified in December 2017.