Delaware Technical Community College

*Proposal for the*

**Environmental Engineering Technology**

**3-Year Comprehensive Plan**

**Fall 2016 (201751) –**

**Spring 2019 (201952)**

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**Environmental Engineering Technology**

**Three Year Comprehensive Plan**

# Abstract

The 2014 Labor Market Scan for Engineering Technologies conducted by the Center for Industry Research & Workforce Alignment (CIRWA) at Delaware Technical Community College reported that nearly 70% of employers found it either difficult or somewhat difficult to find qualified candidates to fill vacancies. The detailed investigation projected state-wide average annual openings to be 28 per year within the next three years in the environmental field. This figure represents a deficit for graduates not only from Delaware Tech, but also from other 4-year institutions in the State of Delaware and elsewhere.

 Two broad objectives were identified within the study (ENV Occupational Brief, **Appendix A**) and included the following:

* *Close the Gap in Projected Demand*
* *Improve Educational Programs to Better Meet Employer Needs*

Environmental Engineering Technology faculty were charged with reviewing the recommendations in this report and developing a three year comprehensive plan to meet these recommendations. In order to develop achievable goals to pursue during the three year comprehensive plan period, each CIRWA recommendation was analyzed in detail and discussed with the Advisory Board during the April 7, 2015 Advisory Committee meeting. After reviewing the information gathered, the faculty and Department chairs developed three goal categories: short term goals (achievable within 0 to 6 months), mid-term goals (achievable within 6 to 18 months), and long term goals (achievable within 18 to 36 months). Goals were developed on a college wide basis, for the Stanton Campus, and for the Owens campus. Once the goals were developed, necessary actions and the resources and/or partnerships needed to achieve these goals were determined.

The following goals have been identified:

College Wide Short-Term Goals

1. *Finalize alignment of classes on the current course sequence sheet for Fall 2016 implementation. (Curriculum Goal)*
2. *Enhance Advisory Committee representation to be fully engaged and to represent the environmental engineering and environmental science community in Delaware. (Recruiting Goal) (Hands on Learning Goal)*
3. *Update the ENV 190 syllabus to better reflect the environmental science and environmental engineering field by January 2016. (Curriculum Goal)*
4. *Update the ENV 271 syllabus to reflect the needs of the industry and change the credits from 2 credits to 3 credits to improve transferability. (Curriculum Goal) (Articulation Goal)*
5. *Develop a syllabus for a new course titled “Environmental Engineering Processes” by January 2016. (Curriculum Goal) (Articulation Goal)*
6. *Pilot a distance learning course for ENV 271: Principles of Site Assessment in Fall 2016. (Curriculum Goal)*

Owens Campus Short-Term Goals

1. *Have faculty host a booth at outreach events such as Lewes Coast Day and the Owens Campus STEM Expo on an annual basis*. *(Recruiting Goal) (Hands on Learning Goal)*
2. *Identify one course within the Environmental Engineering Technology course sequence sheet that could be offered as a study abroad course in addition to a traditional classroom course*. *(Recruiting Goal)* *(Curriculum Goal) (Hands on Learning Goal)*
3. *Participate in the Owens Campus Engineering and Energy Career Fair*. *(Recruiting Goal) (Hands on Learning Goal)*
4. *Evaluate the lab space in JTC 130*.

Stanton Campus Short-Term Goals

1. *Create an “Explore Engineering” day to reach out to Delaware Tech development, undeclared, and dual enrollment students. Hold the event annually during National Engineers Week in February. The objective of this program is to introduce students to engineering technology and to pique their interest in engineering technology fields in a fun, non-threatening, hands-on environment. (Recruiting Goal)*
2. *Participate in the Stanton Campus Engineering Career Expo*. *(Recruiting Goal) (Hands on Learning Goal)*
3. *Participate in the Stanton Campus STEM Expo*. *(Recruiting Goal)*

College Wide Mid-Term Goals

1. *Evaluate and improve the current Environmental Engineering Technology degree to ensure that graduates will have all of the knowledge, skills, and abilities needed to begin working in the industry immediately upon graduation. (Curriculum Goal) (Hands on Learning Goal)*
2. *Create at least one new environmental science connected degree with a local four year institution. (Articulation Goal)*
3. *Explore creating an articulation with the University of Delaware for a Bachelor of Science in Environmental Engineering*. *(Articulation Goal)*
4. *Align teaching tools college wide. (Curriculum Goal) (Hands on Learning Goal)*
5. *Update software and equipment to current versions if applicable*. *(Curriculum Goal) (Hands on Learning Goal)*
6. *Investigate incorporating work experience elements into courses and/or creating internship options in the program*. *(Hands on Learning Goal)*

Owens Campus Mid-Term Goals

1. *Implement solution for JTC 130 lab space determined in the short term goals listed above*.
2. *Add eight additional computers to the structures lab by Fall 2017*. *(Hands on Learning Goal)*

Stanton Campus Mid-Term Goals

1. *Find space for new teaching tools*. *(Hands on Learning Goal)*

College Wide Long-Term Goals

1. *Increase enrollment (Recruiting Goal)*
2. *Explore accreditation options*.
3. *Develop a college wide identity for the architecture, construction management, civil engineering, and environmental engineering technology programs on each campus.*
4. *Explore changes to the college wide organizational structure.*

Owens Campus Long-Term Goals

1. *Implement solution for JTC 130 lab space determined in the short term goals listed above*.

Stanton Campus Specific Long-Term Goals

1. *Create an open computer lab for AET/CET/CMT/ENV/GIS students with 30 computers and drafting tables. (Curriculum Goal) (Hands on Learning Goal)*
2. *Improve Stanton Campus infrastructure to reach 21st century technology, appearance, and online teaching responsibilities*.

The resources needed to support each of the goals are outlined in detail in the report below. In addition to the specific resources needed to support each goal, the following additional resources are required to support these efforts:

1. One full time lab tech to support the Stanton Campus Program and other programs within the AET/CET/CMT/ENV/GIS Department
2. One full time lab tech to Support the Owens Campus Program and the ENV and CET programs.
3. One full administrative assistant to support the Stanton Campus Program and other programs within the AET/CET/CMT/ENV/GIS Department

# Background

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# CIRWA Labor Market Scan

The 2014 Labor Market Scan for Engineering Technologies conducted by the Center for Industry Research & Workforce Alignment (CIRWA) at Delaware Technical Community College reported that nearly 70% of employers found it either difficult or somewhat difficult to find qualified candidates to fill vacancies. The detailed investigation projected state-wide average annual openings to be 28 per year within the next three years in the environmental field. This figure represents a deficit for graduates not only from Delaware Tech, but also from other 4-year institutions in the State of Delaware and elsewhere.

Two broad objectives were identified within the study (ENV Occupational Brief, **Appendix A**) and included the following:

* *Close the Gap in Projected Demand*
* *Improve Educational Programs to Better Meet Employer Needs*

In order to gather additional information from the survey respondents, faculty members in the Architecture Engineering Technology (AET), Civil Engineering Technology (CET), Construction Management (CMT), and Environmental Engineering Technology (ENV) programs conducted follow up phone calls to ask them additional questions related to the Labor Market Scan. A summary of these phone calls can be found in **Appendix D**.

Environmental Engineering Technology faculty were charged with reviewing the recommendations in this report and developing a three year comprehensive plan to meet these recommendations. In order to develop achievable goals to pursue during the three year comprehensive plan period, each CIRWA recommendation was analyzed in detail and discussed with the Advisory Board during the April 7, 2015 Advisory Committee meeting. After reviewing the information gained, the faculty and Department chairs developed three goal categories: short term goals (achievable within 0 to 6 months), mid-term goals (achievable within 6 to 18 months), and long term goals (achievable within 18 to 36 months). Goals were developed on a college wide basis, for the Stanton Campus, and for the Owens campus. Once the goals were developed, necessary actions and the resources and/or partnerships needed to achieve these goals were determined.

# Program Description

The program provides a full range of courses to prepare students for entry-level positions in the environmental engineering technology field. The Environmental Engineering Technology Program is designed to educate students in the general and technical aspects of environmental issues and common practice environmental procedures. The degree focuses on practical education with courses covering the basic quantitative and conceptual skills required of environmental engineering technicians. The curriculum is broad-based to meet the demands of a range of environmental positions.

The Environmental Engineering Technology program is algebra-based with a strong focus on practical skills including using Computer Aided Design (CAD), surveying, Geographic Information Systems (GIS), site assessment, and field sampling. See **Appendix B** for the ENVAASEET Course Sequence Sheet.

The Environmental Engineering Technology program is offered at both the Stanton and Owens campuses. Program alignment between the two campuses is ongoing. The Environmental Engineering Technology Degree currently has two articulation agreements, one with Wilmington University for a Bachelor’s Degree in Organizational Management, and one with Wesley College for a Bachelor of Science Degree in Environmental Science.

The Environmental Engineering Technology Program has been involved in many outreach activities and program improvement activities. Please see **Appendix C** for a complete listing of recent program accomplishments and activities.

# Program Mission

The Environmental Engineering Technology Program provides a curriculum of study which includes job entry fundamentals in: field sampling; sustainability practices; environmental laws and regulations; site assessments; water and wastewater treatment design, operation and treatment processes; stormwater management; water pollution; soils/geology; as well as GIS applications.  The basic environmental engineering technology courses are well integrated with applied practice aimed at giving an individual on the job experience before graduation.

# Program Graduate Competencies

The graduate will be able to:

1. Apply the knowledge, techniques, skills, and modern tools of the discipline to narrowly defined engineering technology activities.
2. Apply a knowledge of mathematics, science, engineering and technology to engineering technology problems that require limited application of principles but extensive practical knowledge.
3. Conduct standard tests and measurements, and conduct, analyze, and interpret experiments.
4. Function effectively as a member of a technical team.
5. Identify, analyze, and solve narrowly defined engineering technology problems.
6. Apply written, oral, and graphical communication in both technical and nontechnical environments; and identify and use appropriate technical literature.
7. Recognize the need for and an ability to engage in self-directed continuing professional development.
8. Integrate a commitment to address professional and ethical responsibilities, with a respect for diversity.
9. Demonstrate a commitment to quality, timeliness, and continuous improvement.
10. Explain the major aspects of the normal ecology of the planet and risks associated with polluting the environment.
11. Apply the concepts of professional practice and the roles and responsibilities of public institutions and private organizations pertaining to environmental engineering.
12. Apply current federal, state and local environmental and safety regulations.

# CIRWA Recommendations

Several key recommendations were identified within the CIRWA study (EET Occupational Brief p. 10, Full Labor Market Scan p. 46) and include the following:

*Occupational Brief Recommendations*

1. *Promote involvement and partnerships with K-12 and other related organizations in an effort to increase teachers’, counselors’, parents’, and middle and high school’s awareness of engineering technology options available to them. (Recruiting Recommendation)*
2. *Explore the possibility of transitioning the Environmental Engineering Technology program into an Environmental Science program. (Curriculum Recommendation)*
3. *Consider adopting a cooperative workplace education experience or internship as a requirement for graduation. (Hands on Learning Recommendation)*
4. *Consider curriculum updates or changes that would place increased emphasis on exposing students to software applications, state codes and regulations, and the importance of developing interpersonal and networking skills. (Curriculum Recommendation) (Hands on Learning Recommendation)*
5. *Consider retiring the AAS in Water Quality current located at the Owens Campus. (Curriculum Recommendation)* **Please note that this recommendation has been fully implemented and will not be discussed further in this document**.

*Full Labor Market Scan Recommendation*

1. *Consider working toward developing a 4-year engineering technology degree within the State of Delaware to stimulate more connected degree opportunities for Delaware Tech Graduates in these fields. (Articulation Recommendation)*

# Recommendation Analysis and Goal Development

In order to develop achievable goals to pursue during the three year comprehensive plan period, each CIRWA recommendation was analyzed in detail and discussed with the Advisory Board during the April 7, 2015 Advisory Committee meeting. After reviewing the information gained, the faculty and department chairs developed three goal categories: short-term goals (achievable within 0 to 6 months), mid-term goals (achievable within 6 to 18 months), and long-term goals (achievable within 18 to 36 months). Goals were developed on a college wide basis, for the Stanton Campus, and for the Owens campus. Once the goals were developed, necessary actions and the resources and/or partnerships needed to achieve these goals were determined. These goals were also aligned with *Blueprint for the Future*, Delaware Tech’s strategic plan.

# Short-Term Goals (Achievable Within 0 to 6 Months)

College Wide Short-Term Goals

1. *Finalize alignment of classes on the current course sequence sheet for Fall 2016 implementation. (Curriculum Goal)*

Goal Description

Alignment of all classes is underway. Any syllabus changes must be adopted and proposed by January 2016 for Fall 2016 implementation. The Course Evaluation Measures Menu for all courses will be completed by June 15, 2016.

Occupational Brief Recommendation Alignment

This goal supports CIRWA Occupational Brief Recommendation 4.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendations I.A. and III.A.

Resource/Partnerships

No additional resources or partnerships are necessary to achieve this goal.

Goal Performance Measure

The updated course sequence sheet and any syllabus changes will be submitted to the Curriculum Committee by December 31, 2015. All Course Evaluation Measures Menus will be submitted to the Curriculum Committee by June 15, 2016.

Note

Please note that if alignment results in changing the number of credits for any courses, Program faculty must investigate whether and how the change will impact current articulation agreements.

1. *Enhance Advisory Committee representation to be fully engaged and to represent the environmental engineering and environmental science community in Delaware. (Recruiting Goal) (Hands on Learning Goal)*

Goal Description

Current representation on the Environmental Engineering Advisory Board mainly reflects employers that hire Bachelor’s Degree graduates. Their input is highly valued and important to the success of the program. However, in order to ensure that good advice for Associate Degree graduates is received, Program faculty would like to attend networking events and reach out to additional environmental firms to develop new relationships. Networking within the environmental community may also lead to developing new internship and work experience opportunities for students and graduates.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendations 1 and 3.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation IV.A.

Resources/Partnerships

In order to achieve this goal Program faculty must be afforded the time to network. Release time of 1 credit per semester is recommended to provide opportunities for networking.

Goal Performance Measure

The number and diversity of attendees at the next Advisory Board meeting will be compared to previous meetings to determine if this goal has been achieved.

1. *Update the ENV 190 syllabus to better reflect the environmental science and environmental engineering field by January 2016. (Curriculum Goal)*

Goal Description

The current ENV 190 syllabus has 16 Core Course Performance Objectives (CCPOs) and 69 Measurable Performance Objectives (MPOs). Many of these objectives are out of date, difficult to measure, and unclear. Program faculty have reviewed the syllabus and drafted recommendations. These recommendations will be shared with Program leadership and the Advisory Committee shortly. Once the recommendations are approved, the syllabus will be updated and submitted to the Curriculum Committee by January 2016 to meet the deadline for Fall 2016 implementation.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 4.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendations III.A. and III.B.

Resources/Partnerships

No additional resources or partnerships are necessary to achieve this goal.

Goal Performance Measure

The updated syllabus will be submitted to the Curriculum Committee by December 31, 2015.

1. *Update the ENV 271 syllabus to reflect the needs of the industry and change the credits from 2 credits to 3 credits to improve transferability*. *(Curriculum Goal) (Articulation Goal)*

Goal Description

The current ENV 271 syllabus does not meet the needs of the industry or reflect current certification requirements. In addition, the class is currently set at two credits which makes articulation difficult. Program faculty have reviewed the syllabus and drafted recommendations. These recommendations will be shared with Program leadership and the Advisory Committee shortly. Once the recommendations are approved, the syllabus will be updated and submitted to the Curriculum Committee by January 2016 to meet the deadline for Fall 2016 implementation.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendations 3 and 4 and Full Labor Market Scan Recommendation 1.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendations III.A. and III.B.

Resources/Partnerships

Faculty time to update the syllabus will be necessary to achieve this goal.

Goal Performance Measure

The updated syllabus will be submitted to the Curriculum Committee by December 31, 2015.

1. *Develop a syllabus for a new course titled “Environmental Engineering Processes” by January 2016. (Curriculum Goal) (Articulation Goal)*

Goal Description

The current program course sequence sheet does not contain any courses that study the fate and transport of pollutants in the environment. Program faculty recommend that a course dedicated to this study be developed. This course would be necessary to pursue an articulation agreement with the University of Delaware’s Environmental Engineering Bachelor of Science program. The syllabus will be created and submitted to the Curriculum Committee by January 2016 to meet the deadline for Fall 2016.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 4 and Full Labor Market Scan 1.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation I.B.

Resources/Partnerships

In order to develop a course that may be transferred to the University of Delaware (UD), Program faculty must collaborate with UD faculty to obtain a current course syllabus, course materials, and recommendations. Delaware Tech faculty have already begun this process. Communications have been positive and supportive to date.

Goal Performance Measure

The proposed syllabus will be submitted to the Curriculum Committee by December 31, 2015.

1. *Pilot a distance learning course for ENV 271: Principles of Site Assessment in Fall 2016. (Curriculum Goal)*

Goal Description

Enrollment has been low on the Owens campus for this course. In order to maximize resources Program faculty would like to run this course as a distance learning course following the model that is successfully being used by the Construction Management program.

Occupational Brief Recommendation Alignment

While this goal does not support a specific Occupational Brief Recommendation, it does contribute to student success to ensure that students will have access to the course in a low enrollment situation.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Goals IV.D and IV.E.

Resources/Partnerships

In order to pilot this course in a distance learning environment and to revise the syllabus, program faculty will need time to review the syllabus and the course content for distance learning. A distance learning camera will also need to be purchased.

Goal Performance Measure

Enrollment and assessment measures in ENV 271 will be used to determine if this goal has been achieved.

Owens Campus Short-Term Goals

1. *Have faculty host a booth at outreach events such as Lewes Coast Day and the Owens Campus STEM Expo on an annual basis*. *(Recruiting Goal) (Hands on Learning Goal)*

Goal Description

Coast Day is hosted by the University of Delaware College of Earth, Ocean, and Environment at the Lewes Campus. The purpose of the event is to showcase how UD, the Department of Natural Resources and Environmental Control (DNREC), and other academic and regulatory entities are working to understand and improve coastal environments and communities. It is fun, interactive, family event. Participating in this event will raise awareness of the Environmental Engineering Technology program.

Program faculty will participate in the Owens Campus STEM expo that is hosted in the spring. This event is designed to raise awareness of Delaware Tech’s STEM program offerings to local high school students.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 1.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation II.A.

Resources/Partnerships

These events are held during evenings and weekends. Flexibility with weekday work hours will be necessary.

Goal Performance Measure

The number of faculty attending Coast Day and the STEM Expo will be used to determine if this goal has been achieved.

1. *Identify one course within the Environmental Engineering Technology course sequence sheet that could be offered as a study abroad course in addition to a traditional classroom course*. *(Recruiting Goal)* *(Curriculum Goal) (Hands on Learning Goal)*

Goal Description

In April 2015, Dr. Mark Brainard articulated a new vision for the study abroad experience at Delaware Tech that aligns with the *Blueprint for the Future* and emphasizes further linkage between study abroad course content and location to the student’s program of study. Identifying a course to include in the study abroad experience will support this vision.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendations 1 and 4.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation III.B.

Resources/Partnerships

Faculty time to develop this study abroad course will be required. If a course is successfully developed, faculty travel time in May 2017 and beyond will be required.

Goal Performance Measure

Identification of a study abroad course candidate by December 31, 2015 will be used to determine if this goal has been achieved.

1. *Participate in the First Annual Owens Campus Engineering and Energy Career Fair*. *(Recruiting Goal) (Hands on Learning Goal)*

Goal Description

The Architectural Engineering Technology (AET) program at the Owens Campus will pilot a Career Fair on November 3, 2015 at the Owens Campus. Faculty and Staff within the Civil & Environmental Engineering Technology program are currently reaching out to industry to gain additional industry support for this event.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendations 1 and 3.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation I.B. and I.D.

Resources/Partnerships

Faculty time to support and attend this event is required to achieve this goal.

Goal Performance Measure

This event is planned for November 2015. The number of faculty attending and the number of participants will be used to determine if this goal has been achieved.

1. *Evaluate the lab space in JTC 130*.

Goal Description

The lab space used in JTC 130 is currently multidisciplinary. The lab area includes sensitive water sampling equipment along with concrete mixing materials, saws and drills, and other construction equipment and building materials. The construction dust generated by construction activities damages the sensitive water sampling equipment purchased with the Experimental Program to Stimulate Competitive Research (EPSCoR) grant.

Occupational Brief Recommendation Alignment

While this goal does not support a specific Occupational Brief Recommendation, it supports the EPSCoR grant by ensuring that expensive equipment is not damaged and a clean lab setting is maintained.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* recommendation III.B.

Resources/Partnerships

Faculty time to conduct the evaluation will be required to meet this goal.

Goal Performance Measure

The recommendations developed to address this problem will be used to determine if this goal has been achieved.

Stanton Campus Short-Term Goals

1. *Create an “Explore Engineering” day to reach out to Delaware Tech development, undeclared, and dual enrollment students. Hold the event annually during National Engineers Week in February. The objective of this program is to introduce students to engineering technology and to pique their interest in engineering technology fields in a fun, non-threatening, hands-on environment. (Recruiting Goal)*

Goal Description

The Explore Engineering event will be open to all Delaware Tech Students, High School Students, and Dual Enrollment Students. Each interested engineering technology program will host a booth showcasing a hands-on activity for their field. The activities will be interactive and hands-on. Each table will also display a sign indicating employment and salaries in their field. Each student participating in the event will be given a passport book. As they complete activities they will receive a stamp in their passport book. Students who complete a pre-determined number of activities will be able to enter their passport book into a drawing to win a $50 bookstore gift card. This will be a pilot project for the 2015-2016 academic year. A student success grant proposal for this event has been drafted.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 1.

*Blueprint for the Future* Alignment

While this goal does not specifically relate to any *Blueprint for the Future* Recommendations, it may contribute to increased enrollment.

Resources/Partnerships

Faculty time to develop the program and funding to support it will be required. A Student Success grant has been drafted.

Goal Performance Measure

The number of programs participating and the number of students attending will be used to determine if this goal has been achieved.

1. *Participate in the Stanton Campus Engineering Career Expo*. *(Recruiting Goal) (Hands on Learning Goal)*

Goal Description

The Engineering Career Fair is a highly successful event hosted in the spring at the Stanton Campus. Program faculty will continue to participate in this event by contacting industry representatives and by attending the event.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendations 1 and 3.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendations I.B. and I.D.

Resources/Partnerships

Faculty time to support and attend this event is required to achieve this goal.

Goal Performance Measure

The number of faculty attending and the number of participants will be used to determine if this goal has been achieved.

1. *Participate in the Stanton Campus STEM Expo*. *(Recruiting Goal)*

Goal Description

Program faculty will participate in the Stanton Campus STEM expo that is hosted in the spring. This event is designed to raise awareness of Delaware Tech’s STEM program offerings to local high school students.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 1.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation II.A.

Resources/Partnerships

Faculty time to develop activities and attend this event is required.

Goal Performance Measure

The number of faculty attending will be used to determine if this goal has been achieved.

**Mid-Term Goals (Achievable Within 6 to 18 Months)**

College Wide Mid-Term Goals

1. *Evaluate and improve the current Environmental Engineering Technology degree to ensure that graduates will have all of the knowledge, skills, and abilities needed to begin working in the industry immediately upon graduation. (Curriculum Goal) (Hands on Learning Goal)*

Goal Description

The current Environmental Engineering Technology degree was developed to provide graduates with the knowledge, skills, and abilities to effectively work in the field immediately upon graduation. Based upon the CIRWA report, there are currently some gaps in the course sequence sheet to provide the graduates with everything they need. Program faculty would like to fully evaluate the program to ensure that employers’ needs are met by our graduates. Faculty would like to explore adding industry certification options into the program to increase graduate marketability.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendations 3 and 4.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendations I.A., I.B., I.C., and III.B.

Resources/Partnerships

No additional resources or partnerships are needed to achieve this goal.

Goal Performance Measure

Course sequence sheet updates and syllabus updates submitted to the Curriculum Committee will be used to determine if this goal has been achieved.

1. *Create at least one new environmental science connected degree with a local four year institution. (Articulation Goal)*

Goal Description

The current Environmental Engineering Technology Associates Degree has one articulation agreement with Wesley College for a Bachelor of Science in Environmental Science. Program faculty would like to explore creating at least one new environmental science connected degree with either Salisbury State or the University of Delaware.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 2.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation I.B.

Resources/Partnerships

No additional resources or partnerships are needed to achieve this goal.

Goal Performance Measure

The development of a new environmental science articulation agreement by December 31, 2016 will be used to determine if this goal has been achieved.

1. *Explore creating an articulation with the University of Delaware for a Bachelor of Science in Environmental Engineering*. *(Articulation Goal)*

Goal Description

Civil Engineering Technology faculty are currently in negotiations with University of Delaware Civil Engineering faculty to develop a connected degree with Civil Engineering. Due to the similar nature of Environmental and Civil Engineering degree programs, if a Civil Engineering articulation agreement is developed for Civil Engineering, it should be straightforward to develop an Environmental Engineering articulation agreement due to the similar nature of the programs. The Environmental Engineering Processes course that was proposed in the short-term goals above will also support this effort.

Occupational Brief Recommendation Alignment

This goal supports Full Labor Market Scan Recommendation 1.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation I.B.

Goals/Partnerships

No additional resources or partnerships are needed to achieve this goal.

Goal Performance Measure

The development a positive relationship with the University of Delaware Environmental Engineering program along with at least one articulation meeting by December 31, 2016 will be used to determine if this goal has been met.

Note

Please note that as new articulation agreements are made with partnering institutions the administrative repercussions for these agreements must be considered. For example, if an environmental science and an environmental engineering connected degree program are developed will that result in additional reporting, budget requirements, etc.

1. *Align teaching tools college wide. (Curriculum Goal) (Hands on Learning Goal)*

Goal Description

In order to support full college wide alignment of courses, Program faculty must ensure that each campus (Owens and Stanton) have the same teaching tools. These tools include environmental sampling equipment, demonstration equipment, computer programs, etc. To align these teach tools college wide a full inventory of the tools each campus has and how the tools are used in the program must be conducted. If it is determined that a campus lacks a tool necessary to effectively teach a concept, that tool must be purchased.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 4.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation III.B.

Resources/Partnerships

Funds to purchase equipment will be required to achieve this goal.

Goal Performance Measure

Full alignment of all teaching tools by December 31, 2015 will be used to determine if this goal has been achieved.

1. *Update software and equipment to current versions if applicable*. *(Curriculum Goal) (Hands on Learning Goal)*

Goal Description

The environmental engineering technology field is dynamic, highly reliant upon technology, and constantly changing. The infrastructure of the program is aging and in some cases software and equipment has not kept up with the industry. In order to effectively teach students the program must have current software and technology. A full inventory of equipment and software must be made to compare to current industry versions. Updated versions of software and equipment must be purchased if gaps are identified.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 4.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation III.B.

Resources/Partnerships

Funds to purchase updated software and equipment will be required to achieve this goal.

Goal Performance Measure

The purchase and implementation of all necessary updated software and equipment by January 31, 2015 will be used to determine if this goal has been achieved.

1. *Investigate incorporating work experience elements into courses and/or creating internship options in the program*. *(Hands on Learning Goal)*

Goal Description

Through the CIRWA Report and Advisory Committee meetings, industry representatives have indicated that real world work experience is necessary to ensure that graduates are fully prepared to enter the workforce. In order to develop these real world work experiences and internship options, relationships with industry representatives must be made and/or strengthened.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendations 3 and 4.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation I.A. and I.C.

Resources/Partnerships

In order to achieve this goal Program faculty must be afforded the time to network. Release time of 1 credit per semester is recommended to provide opportunities for networking.

Goal Performance Measure

The development of at least one new work experience element or internship option by December 31, 2015 will be used to determine if this goal has been achieved.

Owens Campus Mid-Term Goals

1. *Implement solution for JTC 130 lab space determined in the short term goals listed above*.

Goal Description

The lab space used in JTC 130 is currently multidisciplinary. The lab area includes sensitive water sampling equipment along with concrete mixing materials, saws and drills, and other construction equipment. The construction dust generated by construction activities damages the sensitive water sampling equipment. A solution to the problem will be determined in the next six months as described above.

Occupational Brief Recommendation Alignment

While this goal does not support a specific Occupational Brief Recommendation, it supports the EPSCoR grant by ensuring that expensive equipment is not damaged and a clean lab setting is maintained.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation III.B.

Resources/Partnerships

Resources to implement the solution will be required to support this goal.

Goal Performance Measure

Implementation of recommendations gathered shall start by December 31, 2015 to determine if this goal has been achieved.

1. *Add eight additional computers to the structures lab by Fall 2017*. *(Hands on Learning Goal)*

Goal Description

The structures currently only has two computers. These two computers do not meet the needs of the students. Adding new computers would ensure that all students have access to computers to complete assignments and to use in class to support instructor demonstrations. Program faculty would like to add six computers by Fall 2016 and two additional computers by Fall 2017 for a total of 10 computers.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 4.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation III.B.

Resources/Partnerships

A total of eight new computers are needed to support this goal.

Goal Performance Measure

The addition of six computers by August 15, 2016 and two additional computers by August 15, 2017 will be used to determine if this goal has been achieved.

Stanton Campus Mid-Term Goals

1. *Find space for new teaching tools*. *(Hands on Learning Goal)*

Goal Description

Storage space for the Stanton Campus Environmental Engineering Technology program is limited. Space to store any new equipment must be found before the equipment is purchased.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 4.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation III.B.

Resources/Partnerships

In order to achieve this goal the Stanton Campus AET/CET/CMT/ENV/GIS Department may need to find additional storage space.

Goal Performance Measure

Location and adoption of new storage space by December 31, 2015 will be used to determine if this goal has been achieved.

**Long-Term Goals (Achievable Within 18 to 36 Months)**

College Wide Long-Term Goals

1. *Increase enrollment. (Recruiting Goal)*

Goal Description

Both the Stanton Campus and the Owens Campus would like to increase enrollment in the Environmental Engineering Technology program. In order to accomplish this goal, program faculty plan to develop a marketing plan that highlights SEED money and the connected degrees that are available. Program faculty also plan to continue visiting high schools.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 1.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation II.A.

Resources/Partnerships

Program faculty must partner with the Delaware Tech Marketing Department to develop a campus-wide marketing plan including marketing strategies and materials. Funding to implement the marketing plan will be required.

Goal Performance Measure

A comparison of Fall 2019 enrollment numbers to Fall 2016 enrollment numbers will be used to determine if this goal has been achieved.

1. *Explore accreditation options*.

Goal Description

The Owens Campus Civil Engineering program is currently accredited by the Accreditation Board for Engineering and Technology (ABET). This accreditation is expensive and requires a great deal of administrative work to maintain. Program faculty would like to explore whether ABET accreditation is appropriate for the Environmental Engineering Technology program, how much it would cost, and what the benefits are. Program faculty would also like to explore other accreditation options.

Occupational Brief Recommendation Alignment

While this goal does not support a specific Occupational Brief Recommendation it can possibly contribute to recruitment and retention.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation IV.A.

Resources/Partnerships

Program faculty must be given time to research this information. If accreditation is pursued, funding must be made available.

Goal Performance Measure

A decision on whether to pursue accreditation and from whom by December 31, 2017 will be used to determine if this goal has been achieved.

1. *Develop a college wide identity for the architecture, construction management, civil engineering, and environmental engineering technology programs on each campus.*

Goal Description

Creating an identity for students and faculty enrolled in these programs will enhance a sense of belonging for both students and faculty. As learning communities have demonstrated, students who feel like they belong to a team are more likely to persist. The programs have worked to together to develop a college wide program name called Architecture, Construction, Engineering, and Environment or ACE2. Using the ACE2 name, these programs would like to develop a logo that can be used on program materials along with the Delaware Tech logo. Program faculty would also like to create handout materials or “kits” to provide to incoming students to help support this sense of belonging. The kit would be made up of equipment that all students will need both during college and in their career and will include a hardhat, safety vest, tape measure, t-shirt, etc.

Occupational Brief Recommendation Alignment

While this goal does not support a specific Occupational Brief Recommendation, it will contribute to retention.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation III.B.

Resources/Partnerships

Program faculty will need time to partner with Marketing to develop the logo. Funds to purchase the new student kits will also be needed.

Goal Performance Measure

Development of a college wide logo and deployment of new student kits by August 15, 2017 will be used to determine if this goal has been achieved.

1. *Explore changes to the college wide organizational structure.*

Goal Description

With the progress of the college wide programs, alignment, and accreditation, there appears to be a need for a college wide administrative structure that will aid in the learning and success of our students. The current system does not have one Dean/Program Director that oversees the programs, which can sometimes cause conflicts. Other colleges and universities have adopted this model of program administration across multiple campuses to help facilitate alignment and improve the quality of education.

One example of how this would improve program administration is the current Student Learning Outcomes Assessment (SLOA) and General Education Assessment Team (GEAT) assessments. A college wide structure allows assessment to be done with one large pool of students for analyzing data trends. The ENV program currently uses the same assessments for Student Learning Outcomes Assessment (SLOA) and General Education Assessment Team (GEAT) and had to go through the process twice (one per campus) for approval of the same plans. By creating one structure the process for these plans can be simplified and unified to one. Other areas that will see improvement are course development, articulation and program accreditation process, having one point of contact/administration over the program will allow a more streamlined process for college wide programs.

To add or reallocate positions may be beneficial when seeking college wide accreditation. For example, the CMTAASCMT program lead and faculty are investigating accreditation with the American Council for Construction Education (ACCE). According to the ACCE criterion, a visiting team will require visitation to each construction classroom, interview of faculty and program chairs/leads. Program faculty think this process will be feasible if there is one point of contact such as the Dean/Program Director. As such, the Dean/Program Director would also provide leadership, oversight and organization management to this effort.

Please see below an organizational matrix for the Engineering Technologies Department.



No. 1 No. 2

*Figure 1: Proposed Organizational Structure for Engineering Technologies*

The matrix shown in Figure 1 indicates that a college wide dean/program director would oversee the Engineering Technologies Program. The program is comprised of two departments:

* ***Department No. 1:*** Architecture Engineering & Construction Management Technologies (Currently modeled at the Owen’s Campus)
* ***Department No. 2:*** Civil Engineering Technology, Civil Engineering Technology - Surveying and Geomatics Option, Geographic Information Systems Technology, & Environmental Engineering Technology

Each department will have a chair and one (1) faculty member assigned to each discipline. This will allow chairs and faculty to meet the Blueprint *Recommendation No. 4: Refocus the community mission and roles***,** by having a more focused approach to dual enrollment, recruitment, retention, graduation completion, job placement, accreditation and articulation. Two (2) college wide Instructional Coordinators will be assigned to cover the different disciplines within the Engineering Technologies programs.

**Implications**

With the implementation of a revised hierarchal matrix, the Engineering Technologies program will fulfill the recommendations of the Blueprint.We will meet the Blueprint Recommendation No. 1 which is to increase student completion of credentials. For example, Delaware Technical Community College and Polytech High School in Woodside, DE recently entered into a dual enrollment agreement. The CMT 111 Blueprint Reading course will be offered in the spring of 2015. The Polytech faculty will utilize the Delaware Technical Community College Construction Management Technologies’ syllabus, course materials and blackboard shell. This instructional package was created by the college wide AET/CMT team from the Stanton, Terry and Owens campuses. However, our faculty are inundated with a plethora of local and college wide responsibilities that can potentially compromise the effectiveness the agreement such as, but not limited to: forecasting challenges and obstacles, communication, etc.

**Positions**

Dean or Program Director of Engineering Technologies: The incumbent will oversee the fiscal management and procurement of technology for all campuses (i.e. software, computer upgrades, tools, equipment, etc.) The Dean/Program Director will receive a budget from each Department Chair and review in lite of the college wide budgetary system. The Dean/Program Director will submit to the Dean of Instruction for approval. The Dean/Program Director will conduct research for grants and other funding for the engineering technology programs. He/she will act as the liaison for the accreditation of the programs. All hiring of new faculty, adjunct faculty and personnel must be approved by the Dean/Program Director.

Program Chair: All responsibilities are to remain the same per the approved DTCC position description.

Instructional Coordinator: All responsibilities are to remain the same per the approved DTCC position description.

Instructor: All responsibilities are to remain the same per the approved DTCC position description.

Occupational Brief Recommendation Alignment

While this goal does not support a specific Occupational Brief Recommendation, it will contribute to overall program administration and efficiency.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation I.A. and IV.D.

Resources/Partnerships

Program faculty must be given support to implement this new organizational structure.

Goal Performance Measure

Implementation of this new organizational structure by December 2018 will be used to determine if this goal has been achieved.

Owens Campus Long Term Goals

1. *Implement solution for JTC 130 lab space determined in the short term goals listed above*.

Goal Description

The lab space used in JTC 130 is currently multidisciplinary. The lab area includes sensitive water sampling equipment along with concrete mixing materials, saws and drills, and other construction equipment. The construction dust generated by construction activities damages the sensitive water sampling equipment. A solution to the problem will be determined in the next six months as described above.

Occupational Brief Recommendation Alignment

While this goal does not support a specific Occupational Brief Recommendation, it supports the EPSCoR grant by ensuring that expensive equipment is not damaged and a clean lab setting is maintained.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation III.B.

Resources/Partnerships

Resources to implement the solution will be required to support this goal.

Goal Performance Measure

Implementation of recommendations gathered by December 31, 2017 shall be used to determine if this goal has been achieved.

Stanton Campus Specific Long Term Goals

1. *Create an open computer lab for AET/CET/CMT/ENV/GIS students with 30 computers and drafting tables. (Curriculum Goal) (Hands on Learning Goal)*

Goal Description

The Stanton Campus faculty is interested in exploring how to move many classes to a “just in time” hybrid delivery model. This model allows students to learn the course lecture material online on their own time. They can then make an appointment in the lab to complete the hands on activities with Program faculty. This allows students who have challenging schedules to successfully complete their degree. Program faculty would like to have this open lab staffed from 8-8 Monday through Thursday and from 8-4 Friday. Many community colleges are successfully moving towards this model of instruction. Program faculty have attended presentations on how community colleges have implemented this model and believe it would benefit students.

Occupational Brief Recommendation Alignment

This goal supports Occupational Brief Recommendation 4.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation III.B.

Resources/Partnerships

Significant resources are necessary to achieve this goal. The program would need to find space to set up this computer lab, hire additional qualified staff to oversee the lab, and purchase computers and drafting tables to outfit the lab.

Goal Performance Measure

Creation of the open lab space by August 15, 2018 will be used to determine if this goal has been achieved.

1. *Improve Stanton Campus infrastructure to reach 21st century technology, appearance, and online teaching responsibilities*.

Goal Description

Program faculty have heard many complaints about the current state of the Stanton Campus infrastructure. The ceilings are stained and leak, classroom heating and cooling is not properly balanced so that students are either too hot or too cold, and materials and equipment are aging. Improving infrastructure would improve the overall morale of students and help to recruit new students.

Occupational Brief Recommendation Alignment

While this goal cannot be specifically linked to individual CIRWA recommendations, it strongly related to the overall marketability and effectiveness of the Environmental Engineering Technology program.

*Blueprint for the Future* Alignment

This goal supports *Blueprint for the Future* Recommendation III.B.

Resources/Partnerships

Significant funds are necessary to achieve this goal.

Goal Performance Measure

Completion of updates to the infrastructure by August 15, 2018 will be used to determine if this goal has been achieved.

Other Program Resource Needs

In addition to the specific needs listed with each goal above, the Environmental Engineering Technology program has the following additional needs to support these efforts:

1. One full time lab tech to support the Stanton Campus Program and other programs within the AET/CET/CMT/ENV/GIS Department
2. One full time lab tech to Support the Owens Campus Program and the ENV and CET programs.
3. One full administrative assistant to support the Stanton Campus Program and other programs within the AET/CET/CMT/ENV/GIS Department

# Conclusion

The Environmental Engineering Technology Program fully supports the CIRWA recommendations and has developed a plan to meet those recommendations over the next three years. Goals have been identified and are listed below:

College Wide Short Term Goals

1. *Finalize alignment of classes on the current course sequence sheet for Fall 2016 implementation. (Curriculum Goal)*
2. *Enhance Advisory Committee representation to be fully engaged and to represent the environmental engineering and environmental science community in Delaware. (Recruiting Goal) (Hands on Learning Goal)*
3. *Update the ENV 190 syllabus to better reflect the environmental science and environmental engineering field by January 2016. (Curriculum Goal)\*
4. *Update the ENV 271 syllabus to reflect the needs of the industry and change the credits from 2 credits to 3 credits to improve transferability. (Curriculum Goal) (Articulation Goal)*
5. *Develop a syllabus for a new course titled “Environmental Engineering Processes” by January 2016. (Curriculum Goal) (Articulation Goal)*
6. *Pilot a distance learning course for ENV 271: Principles of Site Assessment in Fall 2016. (Curriculum Goal)*

Owens Campus Short Term Goals

1. *Have faculty host a booth at outreach events such as Lewes Coast Day and the Owens Campus STEM Expo on an annual basis*. *(Recruiting Goal) (Hands on Learning Goal)*
2. *Identify one course within the Environmental Engineering Technology course sequence sheet that could be offered as a study abroad course in addition to a traditional classroom course*. *(Recruiting Goal)* *(Curriculum Goal) (Hands on Learning Goal)*
3. *Participate in the Owens Campus Engineering and Energy Career Fair*. *(Recruiting Goal) (Hands on Learning Goal)*
4. *Evaluate the lab space in JTC 130*.

Stanton Campus Short Term Goals

1. *Create an “Explore Engineering” day to reach out to Delaware Tech development, undeclared, and dual enrollment students. Hold the event annually during National Engineers Week in February. The objective of this program is to introduce students to engineering technology and to pique their interest in engineering technology fields in a fun, non-threatening, hands-on environment. (Recruiting Goal)*
2. *Participate in the Stanton Campus Engineering Career Expo*. *(Recruiting Goal) (Hands on Learning Goal)*
3. *Participate in the Stanton Campus STEM Expo*. *(Recruiting Goal)*

College Wide Mid-Term Goals

1. *Evaluate and improve the current Environmental Engineering Technology degree to ensure that graduates will have all of the knowledge, skills, and abilities needed to begin working in the industry immediately upon graduation. (Curriculum Goal) (Hands on Learning Goal)*
2. *Create at least one new environmental science connected degree with a local four year institution. (Articulation Goal)*
3. *Explore creating an articulation with the University of Delaware for a Bachelor of Science in Environmental Engineering*. *(Articulation Goal)*
4. *Align teaching tools college wide. (Curriculum Goal) (Hands on Learning Goal)*
5. *Update software and equipment to current versions if applicable*. *(Curriculum Goal) (Hands on Learning Goal)*
6. *Investigate incorporating work experience elements into courses and/or creating internship options in the program*. *(Hands on Learning Goal)*

Owens Campus Mid-Term Goals

1. *Implement solution for JTC 130 lab space determined in the short term goals listed above*.
2. *Add eight additional computers to the structures lab by Fall 2017*. *(Hands on Learning Goal)*

Stanton Campus Mid-Term Goals

1. *Find space for new teaching tools*. *(Hands on Learning Goal)*

College Wide Long Term Goals

1. *Increase enrollment (Recruiting Goal)*
2. *Explore accreditation options*.
3. *Develop a college wide identity for the architecture, construction management, civil engineering, and environmental engineering programs on each campus.*
4. *Explore changes to the college wide organizational structure.*

Owens Campus Long Term Goals

1. *Implement solution for JTC 130 lab space determined in the short term goals listed above*.

Stanton Campus Specific Long Term Goals

1. *Create an open computer lab for AET/CET/CMT/ENV/GIS students with 30 computers and drafting tables. (Curriculum Goal) (Hands on Learning Goal)*
2. *Improve Stanton Campus infrastructure to reach 21st century technology, appearance, and online teaching responsibilities*.

Resources and Support from Delaware Technical Community College Administration will be necessary to achieve these goals.

Appendices

Appendix A CIRWA Environmental Engineering Technology Occupational Brief

Appendix B Course Sequence Sheet

Appendix C List of Current Program Accomplishments

Appendix D CIRWA Phone Call Summary

## **Appendix A** CIRWA Environmental Engineering Technology Occupational Brief

**Please see attached document**

## **Appendix B**  **Course Sequence Sheet**

**Please see attached document.**

## **Appendix C**  **List of Program Accomplishments**

**Please see attached document**

# Appendix D CIRWA Phone Call Summary

**Please see attached document**