

**DEPARTMENT REPORT  
OF  
PROGRAM LEARNING OUTCOMES ASSESSMENT**

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Department: Environmental Engineering Technology

Program (Degree): Environmental Engineering Technology

Type of Degree:  X  AAS        AA        AS        ATS        AIS

Chairperson: Dr. Nicholas Scambilis                      Date: April 7, 2005

Person(s) Interviewed: Dr. Nicholas Scambilis, Jennifer Wise

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- I. Program Curriculum:** A description of the basis for the program curriculum (i.e., how it is derived and validated). Include accreditation organizations, advisory committees or external groups that influence curriculum. Describe curriculum review activities including the review of course master syllabi.\*

Due to strong interest from students and local industry leaders, the Environmental Engineering Technology degree program was developed and approved in 2000. There continues to be a viable need for employees trained and skilled in environmental engineering technologies.

The program provides a full range of courses to prepare students for entry-level positions in the environmental engineering field. The curriculum provides a background in environmental laws and regulations, site assessments, emergency response to situations involving hazardous chemicals and wastes, storage, treatment, transportation and disposal of hazardous wastes, sampling and analysis, and remediation. Students may choose from elective tracks: Industrial Hygiene Track, and Hazardous Material Abatement Track. Students could also receive a certificate in Hazardous Waste Operations and Emergency Response. Some students are choosing to transfer to a four-year college. An articulation agreement is in place with the University of Findlay where graduates of the program enter as full juniors.

Faculty revised the Environmental Engineering program curriculum after feedback from the TAC-ABET evaluator and review by the program advisory committee. The chemical track was deleted because of low enrollment. Course sequencing was rearranged to adjust prerequisites and offer courses in a more aligned progression for students. Some program requirements were changed including the chemistry sequence to the transfer module. Some courses were deleted because they weren't being offered. Based on student feedback some courses offering were changed from a once a week to twice a week format. One course has been made a distance-

learning course. A Continuous Improvement plan is now in place for Environmental Engineering.

Master Syllabi were reviewed in 2004.

\* Note: Every department is required to review Master Syllabi and Program Learning Outcomes a minimum of every two years.

**II. Program Learning Outcomes:** A description of what you intend for students to know (cognitive), think/feel (affective), or do (psychomotor), when they have completed your degree program. A suggested manageable number of outcomes should be in the range of five to ten. Describe Program Learning Outcomes review activities.\*

The program learning outcomes for Environmental Engineering Technology were reviewed and revised in 2005. The revised program outcomes reflect an updated knowledge base in the field as well as Advisory Committee recommendations regarding local industry needs.

<b>Learning Outcomes</b>	<b>Related Courses are in the CMT database</b>
Develop skills and knowledge to identify, analyze and process hazardous substances and wastes.	
Apply knowledge of environmental laws and regulations in performing compliance assessment audits and pollution prevention surveys.	
Develop skills and knowledge to monitor and analyze contamination distribution in surface water and ground water.	
Develop skills and knowledge to maintain, know the limitations of and use testing equipment to sample and analyze air, water, soil and wastes.	
Develop skills and knowledge of safety procedures to protect themselves, other persons and the environment..	
Understand, follow and apply protocols for environmental site assessments. Detect the conditions indicative of releases or threatened releases of hazardous substances, pollutants, contaminants, petroleum, petroleum products and controlled substances by records review or actual testing. Identify potential environmental liabilities associated with properties considered for transfer.	

Understand and apply the principals of water and waste water treatment systems and solid waste treatment and disposal systems to the operation and maintenance of those systems.

Demonstrate environmental techniques and principals by performing remedial investigation, feasibility studies and by assisting in designing, constructing and maintaining remediation systems.

**III. Assessment Method(s):** A measurable indicator of success in attaining the stated learning outcome(s). The methodology should be both reliable and valid. Please describe in detail.

- a. **Formative Assessment Methods(s) and Description:** a measurable indicator of student in-progress success in attaining the stated learning outcome(s).

Multiple performance based formative assessments are utilized. For example, student's ability to apply knowledge and skills is assessed through environmental site assessment and presentations of findings and cases studies related to real world problem solving situations. Students may also research, either individually or in teams, current environmental issues and present their findings either in writing and/or orally.

Examinations over course contact are also administered.

Faculty continue to develop formative, classroom based assessment of the Engineering Core Competencies on a course by course basis focusing especially on professionalism, communication and citizenship.

- b. **Summative Assessment Method(s) and Description:** a measurable indicator of end-of-program success in attaining the stated program learning outcome(s).

EVT 278 is the Environmental Capstone. Environmental Engineering Technology degree students are assessed to determine their attainment of program outcomes by employing reflective learning through demonstration of environmentally related principles and practices.

Summative assessment is completed via the capstone, EVT 278. Students must incorporate aspects of environmental engineering technology in this course. The course is organized so that the students operate as a contractor team and must divide the work and make sure that each necessary aspect is completed. Because they must operate as a team, this capstone builds group skills as well. Evaluation for the course is based on a checklist, which the instructor shares with students when the project is assigned. Course requirements also include an oral presentation from each student on their piece of the project. Evaluation is given as a group grade. Students are also expected to network with the community by demonstrating their skills to potential employers. This helps students build confidence in their job skills.

Students in EVT 278 have completed different capstone projects. A recent class developed a lake study of three lakes in Ohio. EVT 278 students assessed the lakes for recreation. Next, the students determined which analysis they needed to perform and then completed the sampling and analysis. Finally, EVT 278 students developed a written report and an oral presentation to both the class and the town council of the community in which the three lakes were located.

A formal survey of employers was conducted in 2004 to evaluate the program outcomes and suggestions regarding local industry needs were included in the revision of the Environmental Engineering program outcomes. Exit interviews have been conducted with most graduating students who consistently relate their belief this is a great program. The students indicated that some courses were not offered when they needed them and, based on this feedback, the program course offerings have been adjusted. Also, some students are utilizing College Without Walls to meet their course needs.

- IV. **Results:** A description of the actual results of overall student performance gathered from the summative assessment(s). (see III.b.)

Feedback from employers indicates students are doing well and have the necessary professional knowledge and skills. Graduate surveys will be conducted once graduates have been employed for a time in the field.

More design type projects have been included in the curriculum. The current curriculum focuses more on environmental assessments. There is an ongoing need for students to have additional opportunities to develop creative thinking related to real design problems prior to the capstone course.

- V. **Analysis/Actions:** From analysis of your summative assessment results, do you plan to or have you made any adjustments to your program learning outcomes, methodologies, curriculum, etc.? If yes, describe. If no, explain.

Faculty are integrating design projects within existing EVT courses as they continue to seek additional opportunities to include this aspect of environmental engineering in more courses. The design projects require application of knowledge, creative thinking, and evaluation skills.

The program learning outcomes for Environmental Engineering Technology were reviewed and revised in 2005. The revised program outcomes reflect an updated knowledge base in the field, feedback from the TAC-ABET evaluator and Advisory Committee recommendations regarding local industry needs.

- VI. **General Education:** A description of where and how within the major the three primary general education outcomes\* (communication, thinking, values/citizenship/community) are assessed.

- a. Where within the major do you assess written communication? Describe the assessment method(s) used. Describe assessment results if available.

Written communication exercises are included and assessed in all required technical courses in this program. Emphasis on general education skills is on a course-by-course basis and evaluation of these skills is done by the individual instructor.

- b. Where within the major do you assess oral communication? Describe the assessment method(s) used. Describe assessment results if available.

Oral skills are practiced through team discussion, team reports, and formal presentations in EVT 110, 210, 200 and 278.

The evaluation checklist for oral communication is currently used in EVT courses.

- c. Where within the major do you assess thinking? Thinking might include inventing new problems, seeing relationships and/or implications, respecting other approaches, demonstrating clarity and/or integrity, or recognizing assumptions. Describe the assessment method(s) used. Describe assessment results if available.

All EVT courses include creative thinking and problem solving exercises. Students identify and evaluate relationships expressed in mathematical equations and engineering models in most courses. Students use thinking skills in EVT 200 to explain concepts. Students discuss controversial issues in EVT 110 and 200. Students complete essay questions involving critical thinking in EVT 110, 200, 210 and 107 and 240.

- d. Where within the major do you assess values/citizenship/community? These activities might include behaviors, perspective, awareness, responsibility, teamwork, ethical/professional standards, service learning or community participation. Describe the assessment method(s) used. Describe assessment results if available.

Many EVT courses, especially EVT 200, EVT 110, and EVT 210 involve teamwork. These courses take students out into the community through field trips and research and involve local organizations. Outside speakers are used in EVT 110, 120, 180 and 200 from community organizations like OSHA and the EPA.

Faculty members have integrated the Core Competencies of the Engineering & Industrial Technology Division, including citizenship life-long learning and professionalism, into the curriculum.