



**Final Annual Report**

**Tennessee Tech University**

**President**

**Provost**

**College of Interdisciplinary Studies**

**School of Environmental Studies**

**Environmental and Sustainability Studies MS**



**Program Mission: Professional Science Master's (Environmental Informatics)**

**Department/Unit Contact:** Dr. Hayden Mattingly

**Mission/Vision/Goal Statement**

**Professional Science Master's with a Concentration in Environmental Informatics Program:**

The Professional Science Master's with a concentration in Environmental Informatics, started in Fall 2013, focuses on analytical and computer-based methods in the study and management of natural resources and the environment. The degree program provides students with a business background and concepts that are applicable across fields as diverse as sociology, public policy analysis, business, sustainable systems, and terrestrial/aquatic ecosystem management. The program provides connections to potential employers through internships and also allows professionals the flexibility to earn their degree while working full-time.

Enrollment in the PSM program has been as follows: five students enrolled in 2014-2015, 11 enrolled in 2015-2016, 11 enrolled in 2016-2017, and a projected enrollment of 10 in 2016-2017. Three students graduated in 2015-2016, and five students graduated in 2016-2017.



**Program Goal 1 / Outcomes 1.1, 1.2**

**Define Goal**

**Program Goal 1:** Prepare students who possess the mathematical and scientific knowledge to analyze and manage spatially distributed data needed to obtain sustainable solutions for complex, real-world environmental problems.



### Intended Outcomes / Objectives

#### Student Learning Outcomes:

**Learning Outcome 1.1:** Students will have the ability to apply GIS and statistical tools to manage spatially distributed environmental data to aid in decision making.

Assessment Tools: Internship written report (both student and industry).

**Learning Outcome 1.2:** Students will demonstrate the skills to understand, analyze, and interpret data independently.

Assessment Tools: Internship written reports (both student and industry).



### Program Goal 2 / Outcomes 2.1, 2.2

#### Define Goal

**Program Goal 2:** Prepare students who have the business fundamentals, project management and communication skills necessary to become leaders in their chosen fields.

### Intended Outcomes / Objectives

#### Student Learning Outcomes:

**Learning Outcome 2.1:** Students will demonstrate the ability to integrate business management concepts with environmental information to manage environmental systems.

Assessment Tools: Internship written reports (both student and industry).

**Learning Outcome 2.2:** Students will communicate effectively in oral and written formats.

Assessment Tools: Internship written reports (both student and industry).



### Assessment Method for Program Goals 1 & 2: Internship Written Report by Industry

**Goal/ Outcome/ Objective:** Program Goal 1, 2/Outcomes 2.1, 2.2

**Type of Tool:** Other

#### Rationale

**Assessment Methods:**

**Internship Written Report by Industry:** Internship employers will provide a written evaluation of respective intern's performance in achieving designated deliverables.



### **Rationale for Outcomes and Assessments (Process for Data Analysis):**

**Internship Written Report by Industry:** The evaluation of student and program performance will be aided by external industry reports on student activities during the internship. The industry report will be reviewed by the student's major professor (who is also the instructor for the ESS 6910 internship course) and also by the PSM Program Director.

**Frequency of Assessment:** Annual



### **Assessment Method for Program Goals 1 & 2: Internship Written Report by Student**

**Goal/ Outcome/ Objective:** Program Goal 1, 2/Outcomes 1.1, 1.2

**Type of Tool:** Other

#### **Rationale**

#### **Assessment Methods:**

**Internship Written Report by Student:** During the internship, students will be working in an industry, utilizing knowledge and concepts learned from the curriculum to produce deliverables, which will be presented in writing and during an oral examination. The oral examination and written report will be evaluated by the graduate student's advisory committee to assess whether the student has mastered program and concentration learning outcomes.

### **Rationale for Outcomes and Assessments (Process for Data Analysis):**

**Internship Written Report by Student:** The student will develop better communication skills and will be encouraged to integrate all aspects of the program's core areas (GIS, statistics, business) by writing an internship project report. The report will be evaluated by the industry employer and the student's graduate advisory committee to ensure that it meets satisfactory standards as judged by the committee.

**Frequency of Assessment:** Annual



### **Results: Goal 1 / Outcome 1.1**

**Goal/Objective/Outcome Number:** Goal 1 / Outcome 1.1

#### **Results**

Five students graduated from the PSM program in 2016-2017. Therefore, we have five internship reports from which to gather initial results of program effectiveness. We also received supervisor reports for two of the five students. Several additional graduating students are expected during the 2017-2018 academic year, which will provide even more information for assessing program effectiveness.

**Outcome 1.1** (use GIS and statistical tools to manage spatially distributed environmental data): The supervisor reports from the industry employers generally indicated good student mastery of GIS and



statistical tools. For example, one report stated that the student produced “high-quality results and deliverables” and another report highlighted the student’s “ability to adapt and use modern technology” as her strongest traits.

### Attachments

No items to display.



### Results: Goal 1 / Outcome 1.2

**Goal/Objective/Outcome Number:** Goal 1 / Outcome 1.2

#### Results

Five students graduated from the PSM program in 2016-2017. Therefore, we have five internship reports from which to gather initial results of program effectiveness. We also received supervisor reports for two of the five students. Several additional graduating students are expected during the 2017-2018 academic year, which will provide even more information for assessing program effectiveness.

**Outcome 1.2** (analyze and interpret data independently): Supervisor reports indicated that the students were able to work independently. For example, one supervisor stated that the student was “self-motivated and very good at working independently.” Another supervisor strongly agreed that her student demonstrated an ability to work independently.

### Attachments

No items to display.



### Results: Goal 2 / Outcome 2.1

**Goal/Objective/Outcome Number:** Goal 2 / Outcome 2.1

#### Results

Five students graduated from the PSM program in 2016-2017. Therefore, we have five internship reports from which to gather initial results of program effectiveness. We also received supervisor reports for two of the five students. Several additional graduating students are expected during the 2017-2018 academic year, which will provide even more information for assessing program effectiveness.

**Outcome 2.1** (integrate business management concepts with environmental information): One student created a high-quality poster presentation that could be used as a marketing tool not only for the internship agency but also for the School of



Environmental Studies. Another student used GIS to design motorcycle tour routes and speculated how they might add economic benefits to local businesses to promote regional tourism. The students' advisory committees were glad to see that the students had involved business components to the internship projects. Supervisor reports did not comment specifically on the students' ability to integrate business management concepts with environmental information.

#### **Attachments**

No items to display.



#### **Results: Goal 2 / Outcome 2.2**

**Goal/Objective/Outcome Number:** Goal 2 / Outcome 2.1

#### **Results**

Five students graduated from the PSM program in 2016-2017. Therefore, we have five internship reports from which to gather initial results of program effectiveness. We also received supervisor reports for two of the five students. Several additional graduating students are expected during the 2017-2018 academic year, which will provide even more information for assessing program effectiveness.

**Outcome 2.2** (effective oral and written communication skills): The five graduating students defended and presented their internship projects to their graduate advisory committees and other stakeholders, including internship supervisors and other personnel from the internship agencies. The students also completed written internship project reports. All five students passed their internship "defenses" and their committees approved their project reports, generally indicating successful communication skills. One supervisor agreed that the student produced effective written communications and strongly agreed that the student delivered effective oral presentations.

#### **Attachments**

No items to display.



#### **Modifications and Continuing Improvement: Program Changes Due to Assessments (Outcome 1.1)**

**Goal/Objective/Outcome Number:** Outcome 1.1 (use GIS and statistical tools)

#### **Program Changes and Actions due to Results**

The PSM Industrial Advisory Board met in November 2016 to discuss potential changes to the degree program. The board recommended adopting a fast-track program to boost enrollment, and also changing the GRE requirements to make it more flexible for working professionals. Both of these recommended changes were approved and implemented by TTU in 2017. The board also recommended creating a



certificate program with a technical track and a managerial track. Providing a technical and managerial track for the wider PSM-EI degree program was also discussed. These potential changes will be discussed by program faculty during 2017-2018.

In response to demand from working professionals, and encouragement from the advisory board, the PSM-EI degree program will be offered in a 100% online format beginning in 2017-2018, in addition to the current hybrid format.

The advisory board recommended that all PSM-EI students receive training on developing an online professional portfolio. Faculty will discuss how to implement this in the degree program (potentially could be done during the internship course).

**For Outcome 1.1** (use GIS and statistical tools): No changes were made.

**Link to Assessment**

**Link to Flight Plan:**



### **Modifications and Continuing Improvement: Program Changes Due to Assessments (Outcome 1.2)**

**Goal/Objective/Outcome Number:** For Outcome 1.2 (analyze and interpret data independently)

#### **Program Changes and Actions due to Results**

The PSM Industrial Advisory Board met in November 2016 to discuss potential changes to the degree program. The board recommended adopting a fast-track program to boost enrollment, and also changing the GRE requirements to make it more flexible for working professionals. Both of these recommended changes were approved and implemented by TTU in 2017. The board also recommended creating a certificate program with a technical track and a managerial track. Providing a technical and managerial track for the wider PSM-EI degree program was also discussed. These potential changes will be discussed by program faculty during 2017-2018.

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**For Outcome 1.2** (analyze and interpret data independently): No changes were



made.

**Link to Assessment**

**Link to Flight Plan:**



### **Modifications and Continuing Improvement: Program Changes Due to Assessments (Outcome 2.1)**

**Goal/Objective/Outcome Number:** For Outcome 2.1 (integrate business management concepts with environmental information)

#### **Program Changes and Actions due to Results**

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**For Outcome 2.1** (integrate business management concepts with environmental information): We decided to add one or more questions to the internship supervisor evaluation form in order to collect information on this specific outcome for future students.

**Link to Assessment**

**Link to Flight Plan:**



### **Modifications and Continuing Improvement: Program Changes Due to Assessments (Outcome 2.2)**

**Goal/Objective/Outcome Number:** For Outcome 2.2 (effective oral and written communication skills)

**Program Changes and Actions due to Results**

The PSM Industrial Advisory Board met in November 2016 to discuss potential changes to the degree program. The board recommended adopting a fast-track program to boost enrollment, and also changing the GRE requirements to make it more flexible for working professionals. Both of these recommended changes were approved and implemented by TTU in 2017. The board also recommended creating a certificate program with a technical track and a managerial track. Providing a technical and managerial track for the wider PSM-EI degree program was also discussed. These potential changes will be discussed by program faculty during 2017-2018.

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**For Outcome 2.2** (effective oral and written communication skills): No changes were made.

**Link to Assessment**

**Link to Flight Plan:**