

**BS in ENVIRONMENTAL SCIENCES  
ASSESSMENT PLAN AND REPORT  
2010-2011**

Prepared by: Carrie Wittmer, Professor and Program Director  
April 6, 2011

# Table of Contents

I	Environmental Sciences Program: Introduction and History.....	3
II	Environmental Sciences Program Purpose, Objectives, and Student Learning Outcomes.....	4
	Environmental Sciences Program Purpose.....	4
	Program Educational Objectives.....	4
	Expected Learning Outcomes and courses where they will be assessed.....	4
III	Environmental Sciences Program Assessment Matrix.....	5
IV	Summary of Student Learning Outcomes Assessment Activities 2010-2011 .....	6
V	Summary of Institutional Student Learning Outcomes Activities 2010-2011 .....	7
VI	Plans for Addressing Student Learning Outcomes 2011-2012 .....	9
VII	Changes Resulting from 2009-2010 Assessments .....	10
VIII	Appendices.....	11
	Appendix A: Environmental Sciences Student Learning Outcomes Curriculum Map PSLO #3	
	Appendix B: Course Proficiency Rubric for Human and Natural Systems, PSLO #3	
	Appendix C: Lifelong Learning and Written Communication Assessment Assignment	
	Appendix D: Lifelong Learning and Written Communication Rubrics	
	Appendix E: Oral Communication Rubric	

## I Environmental Sciences Program: Introduction and History

The BS in Environmental Sciences program started in 1995. It is offered only on the Klamath Falls campus of Oregon Institute of Technology.

Enrollment has ranged from a low of eight in 1995 to a high of 44 in 2002. The trend has been declining over the past five years. This decline is related to the growth of the AAS degree Natural Resources at Klamath Community College (KCC) and OIT's new BS in Biology degree (that began accepting students in 2006). Some KCC graduates have transferred into OIT's Environmental Sciences and Biology programs and it is anticipated there will be an increase in this over the next few years.

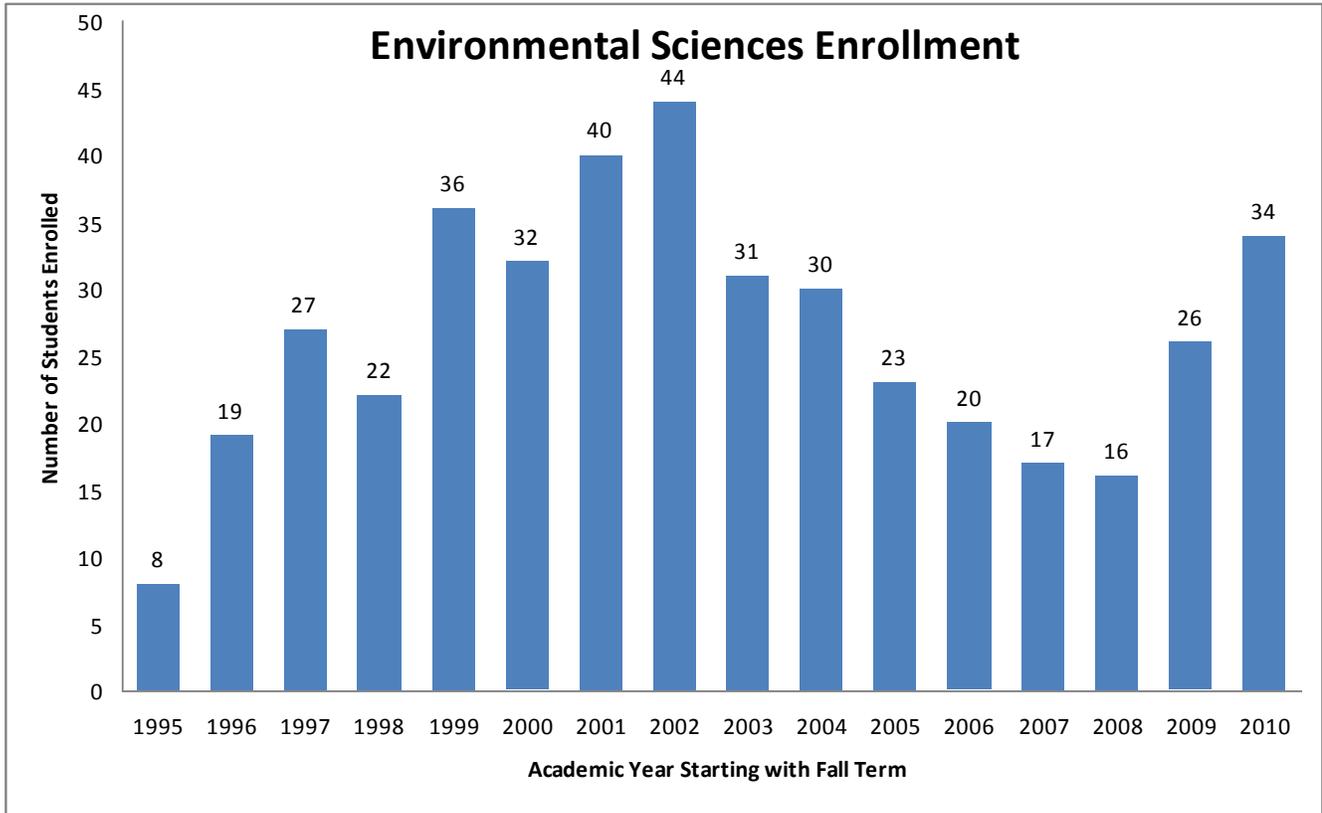


Figure 1. Environmental Sciences enrollment, fall term, 1995-2010.

Given the relatively small enrollment, it is not surprising that the number of graduates averages just under five per year.

The average salary of environmental sciences graduates as reported in 2006 was \$46,667. This was 96% of the average of all OIT graduates in the survey, and was comparable to the average salaries of civil engineering (\$47,990) and clinical laboratory sciences (\$47,192).

## **II Environmental Sciences Program Purpose, Objectives, and Student Learning Outcomes**

### **Environmental Sciences Program Purpose**

The Environmental Sciences program prepares students for immediate employment and graduate studies in the analysis and mitigation of environmental problems. The program focuses on science methodology and applied analysis, applying state-of-the-art field methods, instrumentation, and data analysis to the study of the natural and human environment from an interdisciplinary systems perspective. The curriculum builds on four cores: natural sciences (biology, chemistry, and physics); mathematics (including calculus and statistics); geographic information science (GIS); and integrated social sciences (including economics, geography, and bioregional studies).

### **Program Educational Objectives**

- 1.** Provide knowledge and training in the practical application of the scientific method utilizing appropriate analytical approaches and instrumentation-based methodologies.
- 2.** Prepare students for roles in resource management that require critical thinking and problem solving skills.
- 3.** Prepare students for graduate studies in environmental sciences, natural resource management, environmental education, geography, geographic information science, and regulation.
- 4.** Provide students with technical and analytical skills that enable them to find employment in federal and state resource agencies, consulting firms, community-based education, and industrial firms tasked with environmental compliance.

### **Expected Learning Outcomes and courses where they will be assessed**

Upon completion of the program, students will have demonstrated the following abilities:

- 1.** Apply mathematical concepts, including statistical methods, to field and laboratory data to study scientific phenomena (**BIO 112, BIO 434/MATH 362**).
- 2.** Use GIS to solve geospatial problems (**GIS 205, GIS 316**).
- 3.** Understand the complex relationships between natural and human systems (**BIO 111, BIO 407/484**).
- 4.** Design and execute a scientific project. (**Project course series: BIO 261, 262, BIO 471, 472, 473, 474**).

### III Environmental Sciences Program Assessment Matrix

Table 1 shows the planned three-year assessment rotation cycle on a term-by-term basis for each of the four student learning outcomes.

Table 1. Three-year assessment cycle.

Year		Fall	Winter	Spring
One 2010-2011	<p>#3 Natural/Human Systems</p> <p>Revisit Ethics ISLO</p> <p>Career Planning &amp; Lifelong Learning ISLO</p> <p>Communication Oral and Written ISLO</p>	<p><u>BIO 111</u>: Introduction to Environmental Science</p> <p><u>BIO 407</u>: Sustainable Human Ecology</p> <p><u>BIO 407</u>: Sustainable Human Ecology</p> <p><u>BIO 474</u>: Senior Project Data Analysis and Presentation</p> <p><u>BIO 474</u>: Senior Project Data Analysis and Presentation</p>		
Two 2011-2012	<p>#4 Scientific Projects</p> <p>Revisit Ethics ISLO</p> <p>Revisit Career Planning &amp; Lifelong Learning ISLO</p> <p>Revisit Written Communication</p> <p>#1 Mathematical Competence &amp; Mathematics ISLO</p>	<p><u>BIO 471</u>: Senior Project Proposal Research</p> <p><u>BIO 474</u>: Senior Project Data Analysis and Presentation</p> <p><u>BIO 484</u>: Sustainable Human Ecology</p> <p><u>BIO 474</u>: Senior Project Data Analysis and Presentation</p> <p><u>BIO 474</u>: Senior Project Data Analysis and Presentation</p>	<p><u>BIO 261</u>: Sophomore Project Proposal</p> <p><u>BIO 472</u>: Senior Project Proposal</p> <p><u>BIO 112</u>: Introduction to Data Analysis</p> <p><u>MATH 362</u>: Statistical Methods II</p>	<p><u>BIO 262</u>: Sophomore Project</p> <p><u>BIO 496</u>: Senior Project Data Collection</p>
Three 2012-2013	<p>#2 GIS Skills</p>		<p><u>GIS 205</u>: GIS Data Integration</p> <p><u>GIS 316</u>: Geospatial Vector Analysis I</p>	

## IV Summary of 2010-2011 Student Learning Outcomes Assessment Activities

The outcome assessed during 2010-2011 was: SLO #3 Natural/Human Systems. Assessment activities, including direct and indirect measures, are addressed in this section.

### Student Learning Outcome #3: Understand the complex relationships between natural and human systems. (Curriculum map in Appendix A)

This outcome was evaluated in BIO 111 Introduction to Environmental Sciences (fall 2010) and BIO 407 Sustainable Human Ecology (fall 2010) using a performance criteria rubric (see Appendix B) filled out by the professor (direct measure) and the students (indirect measure) indicating levels of proficiency. Criteria for this PSLO include being able to identify and apply ecological principles to which both natural and human systems are subject in a real-world situation; identify the web of relationships between natural and human communities in one ecosystem; identify ethical considerations in making environmental and social decisions; and identify sound science-based findings and unfounded (junk science) findings relative to current environmental issues. Minimum acceptable performance requirements are 40% of students at “high proficiency” or “proficient” for BIO 111 because it is a 100-level course in the first quarter of freshman year. The upper division course, BIO 407 however, is a senior-level course where students should be proficient in this SLO; therefore, the minimum acceptable performance requirements are at least 80% of students at “high proficiency” or “proficient.”

Table 2. Indirect measure, student self-assessment results for SLO #3: Natural/Human Systems for BIO 111 (fall 2010).

Performance Criteria	Assessment Method	Measurement Scale (High Proficiency, Proficient, Limited Proficiency, No Proficiency—1-4 Scale)	Minimum Acceptable Performance	Results
Identify and apply ecological principles to which both natural and human systems are subject in a real-world situation.	Self-assessment form	% at 3 or 4	40% at 3 or 4	100% at 3 or 4
Identify the web of relationships between natural and human communities in one ecosystem.	Self-assessment form	% at 3 or 4	40% at 3 or 4	94.4% at 3 or 4
Identify ethical considerations in making environmental and social decisions.	Self-assessment form	% at 3 or 4	40% at 3 or 4	94.4% at 3 or 4
Identify sound science-based findings and unfounded (junk science) findings relative to current environmental issues.	Self-assessment form	% at 3 or 4	40% at 3 or 4	100% at 3 or 4

Table 3. Direct measure, faculty assessment results for SLO #3: Natural/Human Systems for BIO 111 (fall 2010).

Performance Criteria	Assessment Method	Measurement Scale (High Proficiency, Proficient, Limited Proficiency, No Proficiency—1-4 Scale)	Minimum Acceptable Performance	Results
Identify and apply ecological principles to which both natural and human systems are subject in a real-world situation.	Paper	% at 3 or 4	40% at 3 or 4	100% at 3 or 4
Identify the web of relationships between natural and human communities in one ecosystem.	Exams	% at 3 or 4	40% at 3 or 4	85% at 3 or 4
Identify ethical considerations in making environmental and social decisions.	Exams	% at 3 or 4	40% at 3 or 4	95% at 3 or 4
Identify sound science-based findings and unfounded (junk science) findings relative to current environmental issues.	Exams	% at 3 or 4	40% at 3 or 4	100% at 4

Table 4. Direct measure, faculty assessment results for SLO #3: Natural/Human Systems for BIO 407 (fall 2010).

Performance Criteria	Assessment Method	Measurement Scale (High Proficiency, Proficient, Limited Proficiency, No Proficiency—1-4 Scale)	Minimum Acceptable Performance	Results
Identify and apply ecological principles to which both natural and human systems are subject in a real-world situation.	Formal Discussion	% at 3 or 4	80% at 3 or 4	100% at 4
Identify the web of relationships between natural and human communities in one ecosystem.	Formal Discussion	% at 3 or 4	80% at 3 or 4	100% at 4
Identify ethical considerations in making environmental and social decisions.	Ethics Assignment	% at 3 or 4	80% at 3 or 4	87.5% at 3 or 4
Identify sound science-based findings and unfounded (junk science) findings relative to current environmental issues.	Formal Discussion	% at 3 or 4	80% at 3 or 4	100% at 4

Table 5. Indirect measure, student self-assessment results for SLO #3: Natural/Human Systems for BIO 407 (fall 2010).

Performance Criteria	Assessment Method	Measurement Scale (High Proficiency, Proficient, Limited Proficiency, No Proficiency—1-4 Scale)	Minimum Acceptable Performance	Results
Identify and apply ecological principles to which both natural and human systems are subject in a real-world situation.	Self-assessment form	% at 3 or 4	80% at 3 or 4	100% at 3 or 4 7/8 at 4
Identify the web of relationships between natural and human communities in one ecosystem.	Self-assessment form	% at 3 or 4	80% at 3 or 4	100% at 3 or 4 7/8 at 4
Identify ethical considerations in making environmental and social decisions.	Self-assessment form	% at 3 or 4	80% at 3 or 4	100% at 3 or 4 7/8 at 4
Identify sound science-based findings and unfounded (junk science) findings relative to current environmental issues.	Self-assessment form	% at 3 or 4	80% at 3 or 4	100% at 3 or 4 7/8 at 4

The BIO 407 Sustainable Human Ecology course was an experimental replacement course for the required course, BIO 485 Klamath Bioregional Studies. This course (as BIO 484 Sustainable Human Ecology) will permanently replace BIO 485 as approved by CPC during the 2010-2011 academic year--and for good reason. Both BIO 111 and BIO 407/484 provide a context for skill and science learning in the program. BIO 407/484 takes the learning perspective outside the Klamath Basin to assess global environmental and social conditions. Enthusiasm for learning in this course as well as in BIO 111 was high and is reflected in the exceptional performance results by both sets of classes. By both indirect and direct measures, minimum acceptable performance levels are not only reached but exceeded. Granted, the sample size was only 8 students for BIO 407, but there is a clear indication that students are performing well in all criteria. No changes in curriculum are required; this is obviously an area of strength for the program.

## V Summary of 2010-2011 Institutional Student Learning Objectives (ISLO) Assessment Activities

The two ISLOs reviewed this academic year were “Lifelong Learning” and “Written and Oral Communication.”

### Lifelong Learning and Written Communication

Lifelong learning and written communication were assessed in one assignment (see Appendix C) using a different rubric for each ISLO (see Appendix D) in BIO 474 Senior Project Data Analysis and Presentation. Assessment results are shown in Table 6. Only three students were enrolled in this course and therefore the data is not sufficient to fully assess this ISLO in the Environmental Sciences Program.

Table 6. Student assessment results for Lifelong Learning and Written Communication ISLO.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
<b>Lifelong Learning</b>			
Lifelong learning	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 3 or 4
Professional societies	1-4 scale, % at 3 or 4	80% at 3 or 4	33% at 3 or 4
Credentials	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 3 or 4
Continuing education	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 3 or 4
Short and long term career plans	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 3 or 4
<b>Written Communication</b>			
Purpose and ideas	1-4 scale, % at 3 or 4	80% at 3 or 4	67% at 3 or 4
Organization	1-4 scale, % at 3 or 4	80% at 3 or 4	33% at 3 or 4
Support	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 3 or 4
Style	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 3 or 4
Conventions	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 3 or 4
Documentation	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 3 or 4

Table 6 shows that in terms of lifelong learning, students are aware of the definitions of lifelong learning and available credentials and continuing education (there was particular interest in attending graduate school). These seniors in the Environmental Sciences Program were prepared with short and long-term career goals. The one place where more work could be done, at least according to this small data set, would be to introduce students to relevant professional societies and to educate them about the advantages of participating in these types of organizations.

In terms of the written communication assessment, all students were a 3 or 4 for providing supporting evidence, using a professional writing style appropriate for the assignment, complying with writing conventions, and documenting sources where relevant. On the other hand, only 2 students of the 3 were a 3 or above for having clearly stated purpose and ideas and only one student received a 3 or better on organization.

### Oral Communication

The Oral Communication ISLO was evaluated in the BIO 474 Senior Project Data Analysis and Presentation course. All students were assessed on their final senior project oral presentation and scored using the Public Speaking Rubric in Appendix E. The minimum acceptable performance level for upperclassmen is that at least 80% of students demonstrate proficiency (score of 3) or higher for each question.

Table 7. Upperclassmen student assessment results for Oral Communication ISLO.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Content	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 4
Organization	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 4
Style	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 4
Delivery	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 3 or 4
Visuals	1-4 scale, % at 3 or 4	80% at 3 or 4	100% at 3 or 4

Proficiency in this ISLO was high, although the data set was only 2 students, since one student took an incomplete for the course and did not give her final presentation during fall 2010 term. The students gave their final senior project presentations to an audience of students, faculty, and Klamath Basin agency personnel and their presentations were professional, polished, and well-delivered; this is reflected in the high results shown above. Again, this is a small data set and may or may not represent results for the entire program, but the data set also does not indicate any areas of concern.

## **VI Plans for Addressing Student Learning Outcomes 2011-2012**

### **Lifelong Learning**

BIO 111 is an introductory course in Environmental Sciences. Since most professional societies and organizations encourage student participation, it would be advantageous to have one lecture session devoted to introducing the benefits of membership to this introductory class. This way, students could take advantage of scholarships, reduced membership fees, participation in conferences etc. throughout their academic careers. This would also set them up for continuing membership once they have graduated from OIT. During the fall 2011 BIO 111 course, a pilot lecture on professional societies will be given. The Environmental Sciences Assessment Coordinator will work with professors of BIO 111 to include this component into the course.

It will, however, take approximately 3 years for traditional students exposed to this information in BIO 111 to be assessed in BIO 474. Therefore, this same assignment will be given in fall 2011 BIO 474 course with an introductory lecture on professional societies. This assignment is an appropriate fit for BIO 474 because it is the only real “capstone” course for Environmental Sciences seniors and it is timed perfectly (fall of senior year) for students to be thinking about their future careers after OIT. Therefore, data can be collected next year to provide a larger data set that can be used to assess student performance on both the professional societies and the other criteria.

### **Written Communication**

Although the three students assessed for written communication did not meet the minimum performance standard of at least 80% having a 3 or 4 in all categories, three students is a very small data set from which to work. Again, this assignment will be given again next fall and can be used to re-assess student performance with a larger data set (enrollment for BIO 474 will be approximately 10 students next year).

### **Oral Communication**

Because of the very high performance ratings for this year, there is no indication that any steps need to be taken to improve student performance in this ISLO. No follow up data collection is required.

### **Ethics**

See below for follow up on Ethics ISLO for 2011-2012.

## VII Changes resulting from 2009-2010 Assessments

### Ethics

During last year's assessment cycle, a BIO 407 Field Methods in Environmental Sciences course was used to assess the Ethics ISLO and minimum performance standards for the ISLO were not met in three of the categories (see Table 8 for results). The same exact assignment was given this year in BIO 407 Sustainable Human Ecology to a class of eight upperclassmen students (see Table 8 for comparison). Definite improvements were made in three of the categories—using the code of ethics, describing parties involved, and choosing an approach. One category showed a decline in performance—describing and analyzing alternative approaches.

Table 8. Upperclassmen student assessment results for ethics ISLO from BIO 407 Field Methods in Environmental Sciences class fall 2009 and BIO 407 Sustainable Human Ecology course fall 2010.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results 2009 BIO 407 Mixed Rankings	Results 2010 BIO 407 All Upperclassmen
Using code of ethics, describes ethical issue(s).	Ethics Assignment & Ethics Rubric	1-4 scale % at 3 or higher	80% at 3 or higher	50%	75%
Describes parties involved and discusses their points of view.	Ethics Assignment & Ethics Rubric	1-4 scale % at 3 or higher	80% at 3 or higher	50%	75%
Describes and analyzes possible/alternative approaches.	Ethics Assignment & Ethics Rubric	1-4 scale % at 3 or higher	80% at 3 or higher	83%	37.5%
Chooses an approach and explains the benefits and risks.	Ethics Assignment & Ethics Rubric	1-4 scale % at 3 or higher	80% at 3 or higher	83%	100%

Again, the data set was small (BIO 407 Field Methods course had 15 students of mixed ranking and BIO 407 had 8 upperclassmen students) and it is therefore difficult to come to any definite conclusions. The result of 75-100% of students achieving scores of 3 or higher in three categories indicates not only improvement from last year but also near-acceptable levels in performance. One suggested challenge with the “describes and analyzes possible/alternative approaches” category is that in the assignment, students are only asked to “describe and analyze possible/alternative approaches to the issue(s).” The rubric, however, evaluates the student on whether or not each alternative is analyzed in terms of effects on parties involved. Unless a student thoroughly reads the rubric, they will not know to include this analysis in their assignments. The students in this study were marked down, according to the rubric, if they did not analyze impacts to involved parties for each of the alternatives they devised. The inconsistency between the assignment and the rubric should be corrected to evaluate whether student performance would improve in this category.

This assignment will be repeated in next year's BIO 484 Sustainable Human Ecology course to monitor improvement. Students will be reminded to read over the rubric carefully while completing the assignment and to include impacts to affected parties when they are analyzing approaches to the ethical issues in the scenario. Additionally, a proposal to CPC has been accepted that adds PHIL 331 Ethics in the Professions and PHIL 342 Ethics in the Humanities in the ENV curriculum as recommended humanities electives. Ethics are important in any profession, but especially the ENV Sciences, where professionals often encounter difficult decisions between conflicting parties. The ENV faculty felt that a recommended humanities elective was an appropriate curriculum change for the program.

## Appendix A

### Environmental Sciences Student Learning Outcomes Curriculum Map 2010-2011 SLO #3

**SLO # 3: Understand the complex relationships between natural and human systems.**

Courses that are shaded below indicate that the SLO above is taught in the course, students demonstrate skills or knowledge in the SLO, and students receive feedback on their performance on the SLO. I = Introduced R = Reinforced E = Emphasized

	Freshman			Sophomore			Junior			Senior		
<b>Fall</b>	BIO 211	Principles of Biology		CHE 221	General Chemistry		CHE 331	Organic Chemistry I		BIO 474	Senior Project Data Analysis & Pres.	R
	GIS 103	Intro to GIS		BIO 225	Riparian Assessment	R	PHY 221	General Physics with Calculus		BUS 415	Environmental Regulation	R
	BIO 111	Intro to Env. Sciences	I E	SPE 111	Fundamentals of Speech		SPE 321	Small Group and Team Com.		TEC Elec	Technical Emphasis	
	MA 111	College Algebra		MIS 275	Introduction to Relational Databases		MA 361	Statistical Methods I		WRI 322	Advanced Technical Communication	
	WRI 121	English Composition		MA 251	Differential Calculus		BIO 471	Senior Project Proposal Research	R	TEC Elec	Technical Emphasis	
<b>Win</b>	BIO 212	Principles of Biology	R	CHE 222	General Chemistry		BIO 407	Sustainable Human Ecology	R E	SOC Elec	Social Sci Elective	
	HU Elec	Humanities Elective		BIO 261	Soph Project Proposal	R	BIO 472	Senior Project Proposal	R	WRI 323	Advanced Technical Communication	
	GIS 105	Map and Compass/GPS		WRI 227	Technical Report Writing		CHE XXX	Technical Emphasis	R	TEC Elec	Technical Emphasis	
	GEO 105	Physical Geography	R	GIS 205	GIS Data Integration		PHY 222	General Physics with Calculus		HU Elec	Humanities Elective	
	MA 112	Trigonometry		MA 252	Integral Calculus		TEC Elec	Technical Emphasis		SOC Elec	Social Science Elective	
	BIO112 or MIS 102	Intro to Data Analysis or Spreadsheet Software Lab										
<b>Spr</b>	BIO 213	Principles of Biology		CHE 223	General Chemistry		BIO 434 or MA 362	Data Analysis Methods or Statistical Methods II		TEC Elec	Technical Emphasis	
	ECO 210N	Principles of Economics and Micro		BIO 262	Sophomore Project	R	BIO 473	Senior Project Data Collection	R	TEC Elec	Technical Emphasis	
	GME 134	Geographical Information Systems		BIO 327	General Ecology	R	PHY 223	General Physics with Calculus		HU Elec	Humanities Elective	
	WRI 122	English Composition		CHE 231 & 232	Streamwater Chemistry & Sampling		WRI 321	Advanced Technical Communication		SOC Elec	Social Science Elective	
							TEC Elec	Technical Emphasis				

## Appendix B

### Course Proficiency Rubric for Human and Natural Systems, PSLO #3 “Understand the complex relationship between natural and human systems.”

**Student Name:**

**Date Assessed:**

**Course Assessed:**

Highlight the course and assessment method used for this student. Faculty circles the level of proficiency.

Performance Criteria & Course Assessed	Assessment Method	High Proficiency 4	Proficient 3	Limited Proficiency 2	No Proficiency 1
BIO 407 BIO 111  Identify and apply ecological principles to which both natural and human systems are subject in a real-world situation.	Formal Discussion Paper	Several relationships between ecological principles and a real-world situation are identified and applied.	Several relationships between ecological principles and a real-world situation are identified and but only applied superficially.	At least one relationship between ecological principles in a real-world situation is identified but not applied.	The relationship between ecological principles and a real-world situation is not addressed.
BIO 407 BIO 111 Identify the web of relationships between natural and human communities in one ecosystem.	Formal Discussion Exams	Multiples of interconnections between natural and human communities are identified within one system. The profound complexity of the system is obvious.	Several interconnections between natural and human communities are identified within one system. The complexity of the system is not obvious.	One to two interconnections between natural and human communities are identified within one system. The complexity of the system is not shown.	No interconnections between natural and human communities are identified at all. Complexity is not shown.
BIO 407 BIO 111  Identify ethical considerations in making environmental and social decisions.	Ethics Assignment Exams	Student identifies several core ethical issues involved in scenario; parties, viewpoints, and alternative solutions are identified. A specific approach or solution to the problem is explained along with its benefits and risks.	Student identifies at least one ethical issue involved related to the topic. Parties, viewpoints, and alternatives are expressed for this issue and a specific approach or solution to the problem is identified but benefits and risks are not explained.	Student identifies at least one ethical issue involved in the scenario. Parties, viewpoints, and alternatives are expressed for this issue but a specific approach or solution to the problem is not explained.	Ethical issues are not identified in the scenario; parties, viewpoints, and alternatives are not addressed.
BIO 407 BIO 111  Identify sound science-based findings and unfounded (junk science) findings relative to current environmental issues.	Formal Discussion Exams	Student identifies several sound research finding and several unfounded findings for a common environmental issue. Rationale for the distinction is explained.	Student identifies at least one sound research finding and one unfounded finding for a common environmental issue. Rationale for the distinction is clearly substantiated.	Student identifies at least one sound research finding and one unfounded finding for a common environmental issue. Rationale for the distinction is not clearly substantiated.	Sound research findings and unfounded findings are not identified; rationale for the distinction is not clearly substantiated.

## Appendix C

### LIFELONG LEARNING AND WRITTEN COMMUNICATION ASSESSMENT ASSIGNMENT

#### Career Planning and Lifelong Learning Assignment

An OIT graduate should be able to continue to develop as a learner and thinker in his or her professional life. This assignment is designed to help you think about your career goals after graduation, your long-term career plans, and the concept of lifelong learning.

For this assignment, please prepare a paper of approximately 1000 words (four full pages), using a double-spaced format. Your paper should address the four broad areas described below. The bulleted items are suggested topics to help you develop your ideas, but you may add your own ideas as well. *Your paper should be written to form a satisfying whole on the subject of your future career and lifelong learning in your profession, rather than as a series of separate answers to the required areas.* In addition to content (topics below), your paper will also be assessed on purpose, organization, support, style, conventions, and use/citation of outside sources. The attached rubrics (2) will be used to evaluate your paper. Please submit two copies of your paper.

Broad topics to be included in your paper:

#### 1. Lifelong learning

- Define and discuss the concept of “lifelong learning” and the need for it.
- As you progress through your career, in what ways do you believe that your learning will continue? How will you make this happen?
- How will you know learning has occurred, or whether more learning is needed?
- Evaluate your current ability to learn independently in your field. Give an example.

#### 2. Professional societies and organizations

- What professional societies or organizations are available in your field or your community and what are the requirements for membership?
- What are the advantages of joining or disadvantages of not joining these organizations?
- How might you be involved/participate beyond basic membership?

#### 3. Credentials and continuing education

- Identify and discuss the different types of credentials (licensure, registration, certification, etc.) or further degrees that are available in your future profession and how to obtain/maintain them.
- Define and discuss appropriate continuing education in your field, either formal or informal, how to obtain it, and the need for it.

#### 4. Short- and long-term career plans.

- Describe your career goals after graduation and your long-term career aspirations.
- What is your plan to meet these career goals and aspirations?

## Appendix D

### LIFELONG LEARNING AND WRITTEN COMMUNICATION RUBRICS

**OIT Lifelong Learning Rubric**

Performance Criteria	Limited or No Proficiency (1)	Some Proficiency (2)	Proficiency (3)	High Proficiency (4)	Score
<b>1. Lifelong learning</b>	Fails to identify the need for “lifelong learning” and/or omits discussion of their own learning and relevant examples.	Misses important elements in discussing “lifelong learning,” applying concepts to their own learning or providing a relevant example.	Defines and discusses at least one concept of “lifelong learning” and the need for it. Applies concept and gives an example related to their own learning.	Defines and discusses various concepts of “lifelong learning” and the need for it. Applies these concepts to their own learning now and in the future. Demonstrates self-awareness by accurately identifying strengths/ weaknesses in their own ability to learn independently. Gives relevant example(s).	
<b>2. Professional societies and organizations</b>	Fails to discuss an appropriate professional society, advantages of joining or disadvantages of not joining, and/or possible involvement/participation.	Misses important elements in identifying appropriate professional societies or organizations, the advantages of joining and disadvantages of not joining, and/or possible involvement/participation.	Identifies and discusses appropriate professional societies or organizations, the advantages of joining and disadvantages of not joining, and possible involvement/participation.	Identifies and thoroughly discusses appropriate professional societies or organizations, the advantages of joining and disadvantages of not joining, and possible involvement/participation. Demonstrates detailed understanding of relevant requirements.	
<b>3a. Credentials</b>	Fails to recognize the need for credentials or further degrees and/or omits information on how to obtain/maintain them.	Identifies available credentials or further degrees, but important elements or details on how to obtain/maintain them are missing.	Identifies and discusses the different types of credentials or further degrees that are available and how to obtain/maintain them.	Identifies and thoroughly discusses the different types of credentials or further degrees that are available and how to obtain/maintain them. Demonstrates detailed understanding of relevant requirements.	
<b>3b. Continuing education</b>	Fails to recognize the need for continuing education (formal or informal) or omits information on how to obtain it.	Misses important elements in identifying appropriate continuing education (formal or informal), how to obtain it, and the need for it.	Identifies and discusses appropriate continuing education (formal or informal), how to obtain it, and the need for it.	Identifies and thoroughly discusses appropriate continuing education (formal or informal), how to obtain it, and the need for it. Demonstrates detailed understanding of relevant requirements.	
<b>4. Short- and long-term career plans</b>	Vaguely describes career goals and/or includes no realistic plan to meet them.	Career goals after graduation do not include both long and short term plans and/or the plan to meet these goals is missing important details or is unrealistic.	Describes realistic career goals after graduation and long-term career aspirations. Includes a plan to meet these goals and aspirations.	Describes realistic career goals after graduation and long-term career aspirations. Includes a thorough and thoughtful plan to meet these goals and aspirations.	

<b>OIT Essay Rubric</b>				
<b>Performance Criteria</b>	<b>Limited Proficiency (1)</b>	<b>Some Proficiency (2)</b>	<b>Proficiency (3)</b>	<b>High Proficiency (4)</b>
<b>Purpose and Ideas</b>	Writing has limited or no focus. Purpose and main ideas are unclear and require inference from reader.	Reader can discern the purpose and main ideas although they may be overly broad or simplistic.	Writing is clear and focused. Reader can easily understand the purpose and main ideas.	Purpose and main ideas are exceptionally focused, clear, and interesting.
<b>Organization</b>	Order and structure are unclear. Introduction and conclusion are underdeveloped or missing.	Order and structure are overly formulaic. Introduction and conclusion may be underdeveloped or too obvious.	Order and structure are clear and easy to follow. Introduction draws in the reader and conclusion brings satisfying closure.	Order and structure are compelling and move the reader through the text easily. Introduction draws in the reader and conclusion brings satisfying closure.
<b>Support</b>	Development is minimal. Some supporting details may be irrelevant or repetitious.	Supporting details are relevant, but are limited or rather general. Support may be based on clichés, stereotypes, or questionable sources or evidence.	The main ideas are well developed by supporting details. When appropriate, use of outside sources provides credible support.	Main ideas are well developed by strong support and rich details. When appropriate, use of outside sources provides strong, credible support.
<b>Style</b>	Voice is inappropriate for topic, purpose, or audience. Wording is incorrect or monotonous, detracting from impact. Sentences tend to be choppy, rambling, and awkward.	Voice is inconsistent for topic, purpose, and audience. Wording is quite ordinary, lacking interest, precision, and variety, and may rely on clichés. Sentences tend to be mechanical rather than fluid with an overuse of simple sentence structures.	Voice is generally appropriate for topic, purpose, and audience. Generally, wording conveys message in an interesting, precise, and natural way. Sentences are carefully crafted with variations in structure.	Voice is appropriate for topic, purpose, and audience. Wording is fresh and specific, with a striking and varied vocabulary. Sentences are highly crafted, with varied structure that makes reading easy and enjoyable.
<b>Conventions</b>	Numerous errors in usage, spelling, punctuation, and/or grammar. Errors sometime impede readability. Substantial editing needed.	Writing contains punctuation, spelling, and/or grammar errors, but they do not impede readability and are not extensive. Moderate need for editing.	Writing demonstrates control of standard writing conventions and uses them effectively to enhance communication. Few errors.	Writing demonstrates strong control of standard writing conventions and uses them well to enhance communication. Very few or no errors.
<b>Documentation</b>	Documentation has major errors or is not present.	Documentation has frequent errors.	Documentation is correct except for a few errors.	Documentation is meticulous.

Rubric created by the OIT Communication Department and approved by the OIT Assessment Commission, February 2009, revised June 2010.

## Appendix E

### ORAL COMMUNICATION RUBRIC

<b>OIT Public Speaking Rubric</b>				
<b>Performance Criteria</b>	<b>No/Limited Proficiency (1)</b>	<b>Some Proficiency (2)</b>	<b>Proficiency (3)</b>	<b>High Proficiency (4)</b>
<b>Content</b>	Few or no attributed sources. Supporting materials lack credibility and/or don't relate to thesis. Limited or no attempt to inform or persuade.	Some attributed sources used. Supporting materials are somewhat credible and/or don't clearly relate to thesis. Attempt to inform or persuade.	Adequate number of credible and appropriately attributed sources used. Supporting materials relate to thesis. Informs or persuades.	A variety of credible and appropriate sources used. Supporting materials relate in an exceptional way to a focused thesis. Informs or persuades.
<b>Organization</b>	Lacks organizational structure. Introduction and/or conclusion missing. No transitions used.	Organizational structure present but unclear with underdeveloped introduction and conclusion. Transitions are awkward.	Appropriate organizational pattern used and easy to follow with developed introduction and satisfying conclusion. Main points are smoothly connected with transitions.	Organizational pattern is compelling and moves audience through speech with ease. Introduction draws in the audience and conclusion is satisfying. Main points are smoothly connected with transitions.
<b>Style</b>	No understanding of audience regarding topic or purpose of speech. Little enthusiasm and passion for topic. No regard for time constraints.	Some understanding of audience regarding topic or purpose of speech. Some enthusiasm and passion for topic. Some regard for time constraints.	Competent understanding of audience regarding topic and purpose. Enthusiasm and passion for topic. Speech given within time constraints.	Thorough understanding of audience regarding topic and purpose. Clear enthusiasm and passion for topic. Speech given within time constraints.
<b>Delivery</b>	No gestures or eye contact. Monotone voice or insufficient volume. Little poise. Reading of notes only. Abundant oral fillers and nonverbal distractions.	Some gestures and eye contact. Ineffective use of language and voice. Little poise. Heavy reliance on notes. Multiple oral fillers and nonverbal distractions.	Adequate use of gestures, eye contact, language, and voice. Poised with minor reliance on notes. Limited oral fillers and nonverbal distractions.	Effective use of gestures, eye contact, vivid language, and voice to add interest to speech. Poised with use of notes for reference only. No oral fillers and nonverbal distractions.
<b>Visuals</b>	No visuals or poorly-designed and documented visuals that distract from speech or do not create interest. Limited reference to visuals or so much reference delivery is hindered.	Visuals present, but simply designed with limited use of documentation. Visuals are referred to but do not create interest. Visuals may interfere with delivery.	Well-designed and documented visuals that clarify speech and create interest. Visuals are referred to and sufficiently discussed, while not interfering with delivery.	Well-designed and documented visuals that clarify speech, create interest, and hold attention of the audience. Visuals are sufficiently discussed and effectively integrated into speech.

Rubric created by the OIT Communication Department and approved by the OIT Assessment Commission, February 2009.