GEOMATICS DEPARTMENT
GIS OPTION
Oregon Institute of Technology
NWCCU Assessment Report
2009/2010

1. Program Introduction

1.1 Program History

Geomatics education has been offered virtually since the inception of the Oregon Institute of Technology, with an associate degree in Surveying initiated in 1951. The program was accredited by the Engineer's Council on Professional Development (ECPD) in 1953. ECPD is now recognized as ABET. A baccalaureate Surveying Technology degree was offered in 1966, and accredited by TAC-ABET in 1970. The program was one of the first two Bachelors of Science surveying programs in the nation to receive RAC-ABET accreditation in 1984. The Geomatics program has enjoyed 57 years of continuous accreditation under ABET or its predecessor, ECPD. OIT can be proud of having the oldest BS Geomatics program in the nation! The program degree title was officially changed from Surveying to Geomatics in 2001, reflecting a global trend recognizing the broadening of the profession and the impact of a revolution in advanced technology. As of 2007 the department now offers the BS Surveying option (former BS Geomatics degree), and the new BS GIS option.

1.2 Enrollment Trends

Geomatics enrollment in both the survey and GIS options for the last 5 years are listed below. It was gratifying to see a 56.5% increase in program enrollment over last five years.

Fall Terms	Year (2005-6)	Year (2006-07)	Year (2007-08)	Year (2008-09)	Year (2009-10)
Full-time Students	46	46	65	67	72

Table 1.1 - Enrollment Trends for Past Five Academic Years

1.3 Retention Rates

The OIT Institutional Research Office tracks full-time new and transfer students who are retained one year later. In addition, the office provides information on new students who are retained by the institution, but who have changed majors. The most recent available data is summarized below.

Fall Terms	Year (2004-05)	Year (2005-06)	Year (2006-07)	Year (2007-08)	Year (2008-09)
First-time Students	0 (0%) (n=1)	5 (55.6%) (n=9)	6 (100%) (n=6)	2 (40%) (n=5)	
First-time Students: Changed major	0	2	0	0	
Full-Time New Transfers	6 (86%) (n=7)	7(100%) (n=7)	3 (75%) (n=4)	TBD	TBD

Table 1.2 - One Year Retention Rates for Geomatics Majors

1.4 Recent Number of Graduates

A summary of the number of geomatics degrees (GIS option) awarded for the last 5 years is shown below.

Fall Terms	Year (2003-04)	Year (2004-05)	Year (2005-06)	Year (2006-07)	Year (2007-08)
First-time Students	NA	NA	NA	1	1

Table 1.3 - Geomatics Degrees Awarded

1.5 Employment Rates and Salaries

Historically, the number of graduates returning Career Services graduate survey forms has been low, for example only 2 responses from the 10 graduates of the Geomatics class of 2006. Geomatics faculty attempted to contact graduates and assist Career Services to obtain significant placement and salary data for graduates. The 2007 employment rate was 100%. The first graduate from the GIS option in 2007 obtained a job from the City of Grants Pass with a starting salary of ~$45,000. The second graduate from the option obtained a job from the United States Forest Service in Cave Junction Oregon, also with a salary of ~$40,000.

2. Program summary

2.1 Summary of Department/Industrial Advisory Committee Discussions

At the September 18, 2009 Geomatics Industrial Advisory Committee meeting, GIS option assessment topics discussed included:

- GIS Option update– Mason Marker and John Ritter
  Enrollment continues to grow in the GIS option, and the new degree option is being received very well in industry. Prof. John Ritter continues to attend professional meetings for program visibility and recruiting.

- Last Spring, students attended the "GIS in Action" and the "Intermountain GIS Conference" and won first place in the map contests at each event. This brought significant notoriety to the program for its first full year of existence.
- Professor Ritter is preparing a proposal for Geomatics to offer a Master's in GIS as an addition to the undergraduate GIS option. This proposal is designed to meet the projected yearly demand for 3000-4000 trained GIS professionals each year in the geospatial industry.

At the September 18, 2009 Geomatics Industrial Advisory Committee meeting, assessment discussion focused on the recent successes of students in the GIS option and the future goals and directions of the option based on industry trends. No specific changes to the current direction of the program were made.

2.2 Geomatics Department Mission, Objectives, and Program Student Learning Objectives (PSLOs)

Department Mission

The mission of the Geomatics Department is to provide students with fundamental knowledge and skills in the geomatics and GIS disciplines. The Surveying Option prepares students to pass the Fundamentals of Surveying (FS) examination and pursue licensure as a registered Professional Land Surveyor (PLS). The GIS Option prepares students to become certified GIS Professionals. All students learn the professional responsibility of protecting the health, safety and welfare of the public, and become aware of global and cultural issues.

Objectives

Program educational objectives are statements that describe the expected accomplishments of graduates during the first few years after graduation—usually 3-5 years. These objectives are consistent with the mission of the program and the institution**.**

Geomatics Department Program Educational Objectives

- Prepare graduates to enter into professional practice
- Provide students with a broad foundation in major geomatics and GIS disciplines
- Prepare students to function effectively on multidisciplinary teams
- Prepare graduates to become licensed or certified professionals.

Program Student Learning Objectives

1. Ability to work effectively in teams
2. An understanding of professional and ethical responsibility
3. Demonstrate critical thinking skills in solving geospatial problems
4. Ability to devise database schema required for addressing geospatial problems
5. Ability to develop customized user interfaces appropriate for geospatial investigations.
6. Ability to appropriately incorporate GPS, CAD, and historical paper-based record data into a GIS framework.
7. Ability to identify geospatial problems and the requisite method, or set of procedures needed to address the issue.
8. Ability to construct a clear, presentable cartographic product that addresses a geospatial issue
9. Understand the software/hardware requirements for implementing a scalable GIS.

2.3 GIS Option Student Learning Opportunities

Geomatics student professional learning opportunities include:

- American Congress on Surveying and Mapping (ACSM) national student surveying competition. Geomatics students organize each year, and begin a fundraising drive to supplement funding provided by professional organizations. Students volunteer as runners to assist with conference details, attend technical paper presentations, and staff the OIT Geomatics department booth.
- Intermountain GIS Conference map contest. Students are able to enter class projects and compete against student projects from academic institutions across the Pacific Northwest.
- GIS in Action Conference. Like the Intermountain Conference, students can enter maps derived from class projects in competition with students from other institutions.
- ESRI ArcGIS Users Conference. Students attending this conference are able to attend seminars, participate in map competitions, and view the application of GIS to dozens of different disciplines.
- GME 468 Geomatics Practicum. Students typically form a hypothetical corporation, and are responsible for completing a number of community service projects for city, county, state, and federal organizations and agencies. During fall quarter, GME 499 Geomatics Practicum was offered for students graduating in March. These students assisted with completion of a BLM cadastral survey, precise deformation monitoring of Ponderosa Junior High School, and planning for use of ODOT RTN GPS network to map City of Klamath Falls fire hydrants. During the academic year, a massive terrestrial, GPS, and hydrographic survey of the Lakeshore drive was completed. Students in GME 343 Boundary Surveys and GME 468 completed a cadastral survey under BLM authority.
- Industry speakers are invited to make presentations at the PLSO Student Chapter meetings.

3. Summary of Three-Year Assessment Cycle

Table 3.1 below depicts the PSLO/ISLO three year assessment cycle for the geomatics GIS option. The table indicates the PSLO/ISLO and the academic year and quarter where the learning outcome will be assessed.

PSLO	ISLO	AY 09/10	AY 10/11	AY 11/12
(1) Ability to work effectively in teams	2	Winter		
(2) An understanding of professional and ethical responsibility	3	Fall		
(3) Demonstrate Critical thinking skills in solving geospatial problems	4			Fall
(4) Ability to devise database schema required for addressing geospatial problems	-		Fall	
(5) Ability to develop customized user interfaces appropriate for geospatial investigations	-		Spring	
(6) Ability to appropriately incorporate GPS, CAD, and historical paper-base record data into a GIS framework	8	Spring		
(7) Ability to identify geospatial problems and the requisite method, or set of procedures needed to address the issue	6&7	Winter	Winter	
(8) Ability to construct a clear, presentable cartographic product that addresses a geospatial issue	1			Spring
(9) Understand the software/hardware requirements for implementing a scalable GIS	5			Winter

Table 3.1 - Three Year Assessment Cycle

4. Summary of Current Academic Year Assessment Activities

4.1 Matrix Summary of 2009/2010 PSLO/ISLOs.

Table 4.1 summarizes the PSLO/ISLOs that will be assessed during the 2009/2010 academic year. The matrix also indicates what course the outcome will be assessed in, the quarter of assessment, the instructor who will perform the assessment, and the method that will be utilized.

PSLO	ISLO	Course	Faculty	Term	Method
(1) Ability to work effectively in teams	2	GIS 456	Ritter	Winter	Peer and Faculty Evaluation
(2) An understanding of professional and ethical responsibility	3	GIS 306	Ritter	Fall	Homework Assignment
(6) Ability to appropriately incorporate GPS, CAD, and historical paper-based record data into a GIS framework	8	GME 134	Ritter	Spring	Project Evaluation
(7) Ability to identify geospatial problems and the requisite method, or set of procedures needed to address the issue	6&7	GIS 316	Ritter	Winter	Project Evaluation

Table 4.1 - 2009-10 Assessment Matrix

4.2 Performance Criteria for GIS Option PSLOs

4.2.1 Teamwork - PSLO (1) / ISLO (2) - The student will demonstrate an ability to function on multi-disciplinary teams

Performance Criteria: The student will

1. Work with a group to achieve a specified goal.
2. Assume roles and responsibilities within the group.
3. Interact appropriately with group members.
4. Reconcile differences with group members when conflicts arise.
5. Share work among group members.
6. Develop strategies and actions to complete assigned tasks.

Winter Quarter, 2010 PSLO (1) / ISLO (2) "Ability to work effectively in teams" was assessed in GIS 456 – Vector Analysis II. The faculty assessed student team performance using the OIT Team and Group Work Rubric. This assessment also included a student evaluation of their team's performance based on the same rubric, which assigned a point score from (1) Limited or no proficiency to (4) High Proficiency. This evaluation is summarized in Tables 4.2 and 4.3 below.

Direct Assessment by Faculty

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Achieves goal/purpose	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
Assumes roles & responsibilities	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
Interacts appropriately	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
Reconciles differences	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
Shares work appropriately	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
Develops strategies/actions	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
3 or 4 on all criteria	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%

Table 4.2 - Assessment Results for SLO (1), GIS 456, Winter 2010

Indirect Assessment: Students rating their teams.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Achieves goal/purpose	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
Assumes roles & responsibilities	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
Interacts appropriately	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
Reconciles differences	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
Shares work appropriately	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
Develops strategies/actions	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%
3 or 4 on all criteria	Rubric-scored team project	1 to 4 scale	70% score at 3 or 4	100%

Table 4.3 - Assessment Results for SLO (1), GIS 456, Winter 2010

Assessment Results

The department goal for this assessment is to have a minimum of 70% of the students score a "3" or higher on all performance criteria. This goal was exceeded.

Actions to be Taken

As this is the first assessment of this particular exercise in GME 456 and the results were significantly above the departmentally established floor, no formal action will be taken at this time.

4.2.2 Ethics and Professionalism - PSLO (2) / ISLO (3) The student will demonstrate an understanding of professional and ethical responsibility

Fall Quarter 2009 PSLO (2) / ISLO (3) Assessment of Ethics

Performance Criteria: The student will

1. Understand and abide by the professional Code of Ethics and OIT Student's Code of Conduct.
2. Evaluate a situation in practice or as a case study, using facts and professional code of ethics.
3. Demonstrate ethical behavior among peers and faculty.
4. Take personal responsibility for their actions.

Fall Quarter, 2009 PSLO (2) / ISLO (3) "…an understanding of professional and ethical responsibility" was assessed in GIS 306 – Vector Analysis I. The assessment consisted of a homework assignment that required the student to read the Rules of Conduct for Certified GIS Professionals published by the GIS Certification Institute and then answer short questions concerning the content of the rules. The student was then presented with a likely scenario from professional practice and then asked to frame a response to the scenario using the Rules of Conduct as a guide. The responses to the questions on the homework assignment where scored from (1) Limited or no proficiency to (4) High Proficiency. The results of the assessment are summarized in the Table 4.4 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Provisions	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	100%
Issues	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	100%
Parties involved	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	100%
Approaches	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	100%
Benefits/risks	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	100%

Table 4.4 - Results of Ethics PLSO Assessment in GIS 306

Assessment Results

The department goal for this assessment was to have a minimum of 70% of the students score a "3" as an average for the entire exercise. This goal was met. Of the 5 students who completed the exercise, all scored fours, or "high proficiency".

Actions to be Taken

As this is the first assessment of this particular exercise in GIS 306 and the results were significantly above the departmentally established floor, no formal action will be taken at this time. This assessment will be reevaluated in the

Spring Quarter 2010 PSLO (2) / ISLO (3) Assessment of Professionalism

Performance criteria: The student will

1. Demonstrate professional behavior in the academic environment.

Spring Quarter, 2010 the faculty rated the professionalism of graduating seniors in the GIS option using the institutional professionalism criteria shown below in Table 4.5. For the assessment, GME department faculty met and reviewed each student based on the items shown in Table 4.5. The faculty collectively agreed on the score for each individual.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Timeliness of work	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Quality of work (course expectations)	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Quality of work (work product)	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Attitude toward feedback	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Attitude toward assigned tasks	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Punctuality	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Attendance	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Academic Integrity	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Interpersonal skills	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Knowledge of classroom policies and procedures	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Work ethic	Faculty Rating	0-2 scale	80% at 1 or 2	100%
Appearance	Faculty Rating	0-2 scale	80% at 1 or 2	100%

Table 4.5 – Assessment results for PSLO (2) / ISLO (3) – Faculty review of Seniors Professionalism

Assessment Results

Spring Quarter of 2010, the GIS option had only two students who were graduating seniors. Both students were exceptional students and always presented themselves in a very professional manner both in class and at outside meetings and conferences. Both student's scores exceeded the institutional and departmentally established minimum 80% for all categories.

Actions to be Taken

All areas of this assessment exceeded the minimum requirements so no formal action will be taken at this time.

4.2.3 An ability to appropriately incorporate GPS, CAD, and Historical Paper Based Data into a GIS - PSLO (6)

Performance Criteria: The student will

1. Identify that a GIS project requires data not currently available in a GIS or Database format.
2. GPS, CAD, and/or paper records selected enhance the solution of the problem the GIS is created to solve.
3. GPS, CAD, and/or paper records were brought into the GIS utilizing appropriate methodologies.
4. Quality control and assurance was instituted to verify the quality of the data being imported into the GIS.

This assessment was done utilizing lab activities presented to students in the GME 134 (Introduction to GIS) course. The following is a brief description of the activity that was assessed to determine student performance on each of the stated criteria:

1. For criteria 1, during the last three weeks of the quarter students, after having developed and practiced several GIS data assimilation/processing skills, were asked to make a map displaying a topic of interest to them. They were shown the data archives of the GIS Service Center and possible on-line data sources that they might use. This assessment is a result of the evaluation of this effort.
2. For criteria 2, students were instructed in the manner in which CAD and KML data can be brought into a GIS framework. This assessment resulted from the evaluation of five different CAD/KML conversion assignments given during the term.
3. Criteria 3 was assessed via a final map project that required the student to insert both CAD and GPS data into a map product.
4. Criteria 4 was assessed via the original map creation that students were requested to produce as part of their final project.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Identify that GIS project requires data not currently available in GIS format	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	94%
GPS, CAD, and/or paper records selected enhance the solution of the problem	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	97%
GPS, CAD, and/or paper records were brought into GIS utilizing appropriate methodologies	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	97%
Appropriate quality control/quality assurance procedures were used to insure the quality of the imported data	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	94%
Percent of students scoring 3 or 4 in all areas				94%

Table 4-6 – Assessment results for PSLO (6) – Assessment of ability to incorporate GPS, CAD, and historical paper based record data into a GIS framework.

Assessment Results

The department goal for this assessment was for students to achieve a minimum of 70% of all students scoring a “3” or higher on all criteria. This goal was met with a score of 94%.

Actions to be Taken

The results for this assessment were above the department goal of 70% of “3” or higher on all criteria so no action will be taken on this item.

4.2.4 - PSLO (7) - Ability to identify geospatial problems and the requisite method, or set of procedures needed to address the issue.

Performance Criteria: The student will

1. Relate theoretical concepts to practical, appropriate solutions.
2. Demonstrate understanding of how various pieces of the problem relate to each other and the whole.

3. Check solutions for validity if possible.
4. Use appropriate resources to locate needed information and effectively integrate information to develop an effective solution.

This item was scheduled for assessment in GIS 316 winter quarter of 2010. However, the course was not assessed at the scheduled time. This item was assessed in the 2008/2009 report and no deficiencies were found. Since this item was missed on this year's assessment cycle, it will be rescheduled with next year's cycle and be assessed at that time.

5. Evidence of Student Learning

5.1 Summary of Department Discussions on Assessment Activities

Geomatics faculty met at the beginning of each quarter during the 2009-2010 academic year to plan assessment activities and discuss assessment results from the previous quarter. All department discussions included faculty from both the survey option and the GIS option.

5.2 Summary of Faculty Decisions on Program Improvements

Assessment did not show any areas not meeting the departmentally established minimum performance criteria in the GIS program during this assessment cycle. While assessment indicates no immediate problems to be addressed, GME faculty are continuing work to improve the program. Areas within the program that have been identified as needing additional attention in the coming academic year include:

1. Additional release time for Dr. John Ritter from the Department of Natural Resources so he may continue to expand GIS offerings.
2. Additional recruiting efforts to draw students to the GIS option.
3. Develop relationships with Lane Community College and Portland Community College to help students in their two year GIS certification programs transfer to OIT.
4. Students in the GIS option expressed concerns that they did not feel prepared when they got to the GME 451 (Geodesy) and GME 452 (Map Projections) course work in their senior year because they had not used many of the required basic calculations since their freshman year. This item was discussed at the faculty assessment meeting, and Dr. Ritter and Professor Walker agreed to find places in the curriculum where additional problem sets can be added.

6. “Closing the Loop” – Changes Resulting from Assessment

No issues were identified last year, so there are no follow-up reports for the 2008/2009 assessment.

7. References

Oregon Institute of Technology. Institutional Research Home Page. December 18, 2009 <http://www.oit.edu/ir>

8. Appendices

Appendix A – SLO Curriculum Maps

Geomatics – GIS Option
PSLO Curriculum Map
2009/2010
PSLO (1) / ISLO (2)

PSLO (1) / ISLO (2): Students will demonstrate an ability to work effectively in teams.

	Freshman		Sophomore		Junior		Senior	
Fall	GME 161		GIS 306		GIS 446		GME 425	
	GIS 103		GME 241				GME 451	
							GIS 456	
Winter	CIV 112		GME 242		GIS 205		GIS 446	
	GME 175		GIS 316		GIS 332		GME 452	
	GIS 105						GME 454	
Spring	GME 134		GIS 426		GIS 432		CIV 221	
	GME 162						GME 468	

Shaded courses indicate that the PSLO is taught in the course and that students are evaluated on the outcome.

Geomatics – GIS Option
PSLO Curriculum Map
2009/2010
PSLO (2) / ISLO (3)

PSLO (2) / ISLO (3): Student will demonstrate an understanding of professional and ethical responsibility

	Freshman		Sophomore		Junior		Senior	
Fall	GME 161		GIS 306		GIS 446		GME 425	
	GIS 103		GME 241				GME 451	
							GIS 456	
Winter	CIV 112		GME 242		GIS 205		GIS 446	
	GME 175		GIS 316		GIS 332		GME 452	
	GIS 105						GME 454	
Spring	GME 134		GIS 426		GIS 432		CIV 221	
	GME 162						GME 468	

Shaded courses indicate that the PSLO is taught in the course and that students are evaluated on the outcome.

Geomatics – GIS Option
PSLO Curriculum Map
2009/2010
PSLO (6)

PSLO (6): Students will demonstrate the ability to incorporate GPS, CAD, and historical paper-base record data into a GIS framework.

	Freshman		Sophomore		Junior		Senior	
Fall	GME 161		GIS 306		GIS 446		GME 425	
	GIS 103		GME 241				GME 451	
							GIS 456	
Winter	CIV 112		GME 242		GIS 205		GIS 446	
	GME 175		GIS 316		GIS 332		GME 452	
	GIS 105						GME 454	
Spring	GME 134		GIS 426		GIS 432		CIV 221	
	GME 162						GME 468	

Shaded courses indicate that the PSLO is taught in the course and that students are evaluated on the outcome.

Geomatics – GIS Option
PSLO Curriculum Map
2009/2010
PSLO (7)

PSLO (7): The student will demonstrate an ability to identify geospatial problems and the requisite method, or set of procedures needed to address the issue.

	Freshman		Sophomore		Junior		Senior	
Fall	GME 161		GIS 306		GIS 446		GME 425	
	GIS 103		GME 241				GME 451	
							GIS 456	
Winter	CIV 112		GME 242		GIS 205		GIS 446	
	GME 175		GIS 316		GIS 332		GME 452	
	GIS 105						GME 454	
Spring	GME 134		GIS 426		GIS 432		CIV 221	
	GME 162						GME 468	

Shaded courses indicate that the PSLO is taught in the course and that students are evaluated on the outcome.