GEOMATICS DEPARTMENT
GIS OPTION
Oregon Institute of Technology
NWCCU Assessment Report
2012/2013

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. Oregon Tech 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 both on the Klamath Falls campus.

1.2 Enrollment Trends

Fall Terms	Year (2009-10)	Year (2010-11)	Year (2011-12)	Year (2012-13)
Full-time Students	7	7	9	7

Reported values represent enrollment during the fourth week of fall quarter as recorded by Oregon Tech Institutional Research.

Table 1.1 – Geomatics GIS Option enrollment trends

1.3 Recent Number of Graduates

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

	Year (2009-2010)	**Year** (2010-2011)	**Year** (2011-2012)	**Year** (2012-2013)
Degrees Awarded	3	1	3	4

Table 1.3 – Geomatics degrees awarded (GIS Option)

1.4 Employment Rates and Salaries

At the time of writing this report (June 13, 2013) none of the four students graduating have reported finding employment. All have expressed that they will continue to seek employment during the summer in the GIS profession and will report to faculty when they are successful in obtaining employment.

2. Program summary

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

On September 24th, 2012, the Survey Option of the Geomatics Program was reviewed by ABET. The ABET evaluation team identified the Program Educational Objectives (PEOs) to not be sufficient. As a result of this, GME faculty met and reviewed the PEOs and developed new ones that matched current ABET requirements. The department goal for the next ABET review is to have both the GIS and Survey options become ABET accredited so it was decided to have the PEOs stand for both programs. The revised PEOs are given below. In addition to changing the PEOs, GME faculty also decided to change the GIS Option Program Student Learning Objectives (PSLOs) to align with the Survey Option and current ABET requirements. The new GIS Option PSLOs are also given below. The mission statement for the department will remain the same.

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 related to their discipline.

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**.**

Graduates of the Oregon Tech Geomatics Options will::

1. Acquire the ability to obtain professional licensure and/or certifications in the geospatial industry.
2. Advance in the geospatial industry during their career by becoming involved in local, state, national, or international professional organizations.
3. Obtain industry positions requiring increased responsibility.
4. Assume responsibility for lifelong learning in professional and personal development.
5. Demonstrate readiness for graduate education and/or advanced technical education.

Program Student Learning Objectives (PSLO)

Program Student Learning Objectives were changed for the 2012/2013 academic year in order to align them with ABET objectives and those currently used to assess the Survey option students. This will allow for more uniform comparison between options and the ability to assess both options in courses that both are required to take.

(a) An ability to apply knowledge of mathematics, science, and applied sciences
(b) An ability to design and conduct experiments, as well as to analyze and interpret data
(c) An ability to formulate or design a system, process or program to meet desired needs
(d) An ability to function on multi-disciplinary teams
(e) An ability to identify and solve applied science problems
(f) An understanding of professional and ethical responsibility
(g) An ability to communicate effectively
(h) The broad education necessary to understand the impact of solutions in a global and societal context
(i) A recognition of the need for, and an ability to engage in life-long learning
(j) A knowledge of contemporary issues
(k) An ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.

Note: The expected learning outcomes for the GIS option are based on ABET/ASAC accreditation guidelines.

2.2 GIS Option Student Learning Opportunities

Geomatics student professional learning opportunities include:

- National Society of Professional Surveyors (NSPS) 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 Oregon Tech 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 act as survey project manager and are responsible for completing a number of community service projects for city, county, state, and federal organizations and agencies. .
- Industry speakers are invited to make presentations at the Geomatics club student meetings.

3. **Summary of Six-Year Assessment Cycle**

As a result of ABET program evaluation recommendations and a switch to a six year cycle for institutional student learning outcomes (ISLO), Geomatics faculty have decided to switch from a three year assessment cycle of PSLOs to a six year cycle.
Table 3.1 shown below depicts the six year PSLO/ISLO assessment cycle for the geomatics GIS option. Table 3.1 indicates the PSLO/ISLO and the academic year and quarter where the learning outcome will be assessed.

PSLO	ISLO	AY 12/13	AY 13/14	AY 14/15	AY 15/16	AY 16/17	AY 17/18
(a) an ability to apply knowledge of mathematics, science, and applied sciences	6						Fall
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-		Winter				
(c) an ability to formulate or design a system, process or program to meet desired needs	4		Winter				
(d) an ability to function on multi-disciplinary teams	2	Winter					
(e) an ability to identify and solve applied science problems	-				Fall		
(f) an understanding of professional and ethical responsibility	3	Fall					
(g) an ability to communicate effectively	1					Winter	
(h) the broad education necessary to understand the impact of solutions in a global and societal context	8				Winter		
(i) a recognition of the need for, and an ability to engage in life-long learning	5					Fall	
(j) a knowledge of contemporary issues	-			Winter			
(k) an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice	7			Winter			

Table 3.1 – Six Year Assessment Cycle

4. Summary of Current Academic Year Assessment Activities

4.1 Matrix Summary of 2012/2013 PSLO/ISLOs.

Table 4.1 summarizes the PSLO/ISLOs that will be assessed during the 2012/2013 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
(d) An ability to function on multi-disciplinary teams.	2	GME 455	Marker	Winter	Team Evaluation (Instructor and Peer)
(f) An understanding of professional and ethical responsibility.	3	GIS 446	Ritter	Fall	Homework Exercise

4.2 Summaries of individual assessment activities

4.2.1 PSLO (d) / ISLO (2) – "An ability to function on multi-disciplinary teams".

Performance Criteria: The student will

1. Be able to identify and achieve a goal/purpose.
2. Be able to assume roles and responsibilities.
3. Communicate effectively.
4. Reconcile disagreement.
5. Share appropriately.
6. Develop strategies for effective action.
7. Cultural adaptation.

Spring quarter 2013 PLSO(d)/ISLO (2) Assessment in GME 455 – GNSS Applications

Student's ability to work in teams was assessed in the GIS Option curriculum in GME 455 – GNSS Applications. The goal of the assessment was to determine how well students could interact with their group, distribute tasks across the group appropriately, and resolve conflicts within the group when and if such conflicts occurred. The teams were scored utilizing the Oregon Tech Team and Group Work Rubric which includes both student evaluation of the group's effectiveness and instructor feedback. The evaluation of students in the GME 455 course allowed the evaluation of student group performance under an open framework of a management position. In this course, students were expected to define goals from a general problem, develop a work schedule, and address group issues with less guidance and instructor direction than is typically encountered in lab settings. The results of these assessments are summarized in tables 4.2 and 4.3 below.

Direct Assessment by Faculty Evaluating Student 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%

Note: Number of students assessed was 3 (1 group)

Table 4.2 – Instructor rating of teams for PSLO (d)/ ISLO (2), GME 468, Spring 2013

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%

Note: Number of students assessed was 3 (1 group)

Table 4.3 – Students rating their teams for PSLO (d)/ISLO (2), GME 455, Winter 2013

Assessment Results

The results for this assessment were exceptional. Students formed their teams during the first week of class and had schedules and assigned tasks for group members early in the second week. The class as a whole was excellent to work with as all of the students were eager to learn GNSS surveying techniques and brought an extra energy to the classroom above and beyond that normally expected. Both instructor and student evaluations of group performance were exceptionally high.

Actions to be taken

No actions will be taken on this PSLO/ISLO at this time.

4.2.2 PSLO (f)/ISLO (3) – "An understanding of professional and ethical responsibility."

Performance Criteria: The student will

1. Demonstrates knowledge of the professional code of ethics for the profession.
2. Used the code of ethics to describe ethical issues.
3. Given a scenario that might occur in their profession, be able to identify the parties involved and be able to discuss the points of view of each party.
4. Given a scenario, be able to identify alternative courses of action in the scenario that comply with the professional code of ethics.
5. Be able to identify the risks and benefits associated with their actions in relation to ethical decision making.

Fall Quarter 2012 PLSO(f)/ISLO (3) - Assessment in GIS 446 – GIS Database Management

PSLO (f) / ISLO (3) "…an understanding of professional and ethical responsibility" was assessed in GIS 446 – GIS Database Development fall quarter of 2012. The assessment consisted of a homework assignment that required the student to read the GIS Professional Code of Ethics as put forth by the Urban and Regional Information Systems Association (URISA) and then answer short questions concerning the content of the document. The student was also presented with a likely scenario from professional practice and then asked to frame a response to the scenario using the professional ethics statement from URISA 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
Knowledge of Code	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	100%
Describes Issues	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	70%
Describes Parties involved	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	70%
Describes Alternatives	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	90%
Benefits/risks of choices	Rubric-scored assignment	1 to 4 scale	70% score at 3 or 4	90%

Note: Number of students assessed was 10

Table 4.4 -Assessment Results for PSLO f (ISLO 3), GIS 446, Fall 2012

Assessment Results

GIS 446 students met the department requirements but did not perform as well as survey option students assessed in GME 343. The reason for this lower performance is most likely due to the fact that this group of students is mostly seniors and had not been exposed to many discussions on professional ethics in earlier course work. During the 2010-2011 academic year a section on professional ethics was added in both GME 161 and GME 241. The students in GME 343 had this additional material while those in GIS 446 had not. The scores will most likely go up with the next assessment because the students will have had the additional exposure to the code of ethics and ethical issues in professional practice.

Actions to be Taken

All areas scored above the department established minimum of 70%. No action will be taken at this time.

4.2.3 – Industrial Advisory Committee Meetings

Assessment Results

Geomatics faculty met with the IAC three times during academic year 2012/2013. The meetings occurred in September during convocation, January during the annual Professional Land Surveyors of Oregon (PLSO) conference, and at the end of spring quarter at the Wilsonville campus. The IAC did not identify any program issues for the survey option to consider. Meeting times were primarily focused on formulating strategies for obtaining additional equipment required for the Wilsonville campus, obtaining a laser scanner for both programs, and obtaining the $3000 required to fund the geomatics student scholarship.

Actions to be taken

No IAC recommendations for program improvement were made this year.

4.2.4 – Senior Exit Survey

At the end of the GME 468 (Senior Practicum) course, students are given the opportunity to answer a short survey regarding their experience in the program. One of the questions asks the student to rate how well prepared they felt that they were for each of the program student learning outcomes a-k. This provides an indirect assessment from the students on how well they feel they have been prepared for each of the objectives stated for the program. The survey is administered online to graduating seniors using the Qualtrics survey tool.

Performance Criteria: The student will feel that they are prepared or highly prepared in PSLO a-k recognized by the geomatics department.

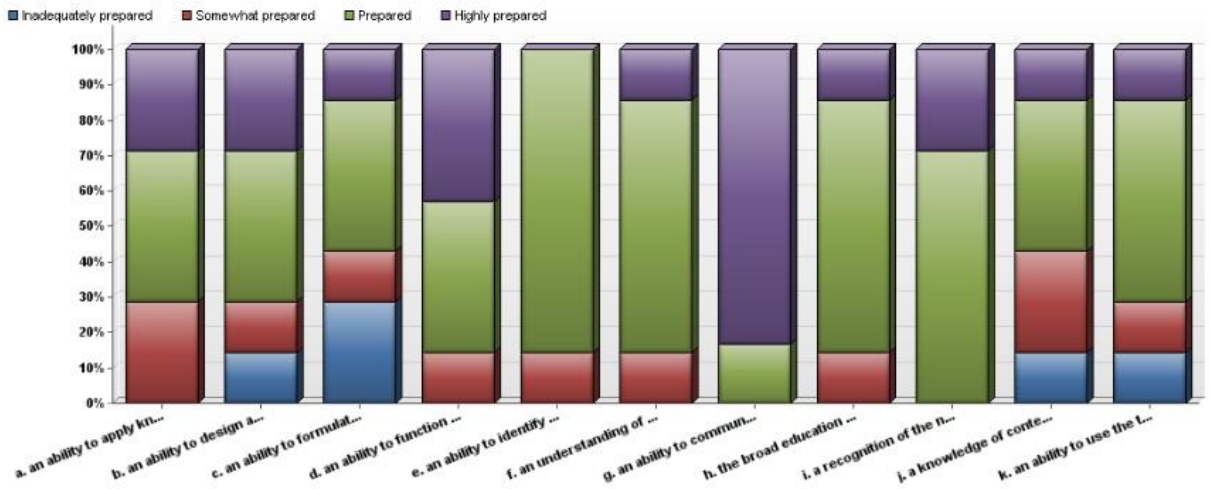

Figure 4.1 – Senior exit survey results for student individual feeling of preparation for each PSLO for academic year 2012/2013.

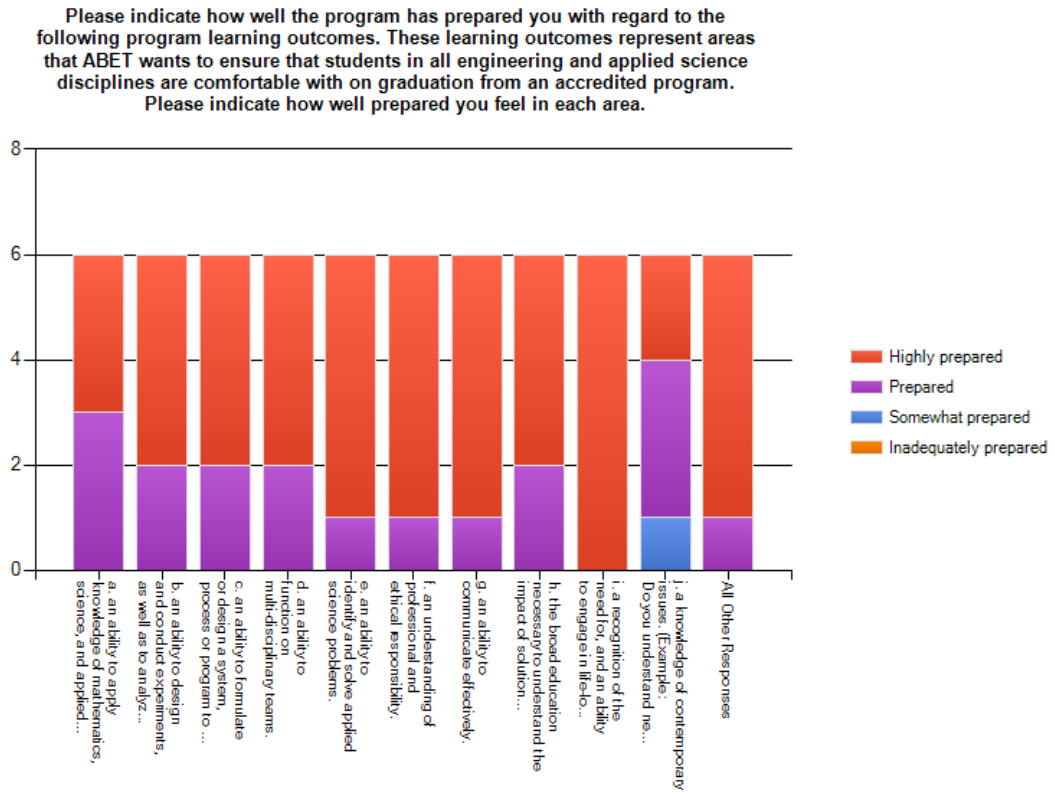

Figure 4.2 – Senior exit survey results for student individual feeling of preparation for each PSLO for academic year 2011/2012.

Assessment Results

Comparison of Figure 4.1 and Figure 4.2 show that this year, there has been a reduction in student's perception of how well prepared they are for each of the Program Student Learning Outcomes (PSLO). This decrease is most likely do to the individual understanding of the PSLOs rather than a weakness in how they are presented to students. Faculty have continued to tie a-k PSLOs to individual class work in course syllabi in order to help students better understand the relationship between individual assignments and program outcomes. To further support the supposition that this is a one year occurrence, PSLOs that have historically not scored low (b and c for example) scored low in this year's results.

Actions to be taken

No action will be taken until the 2013/2014 senior exit poll has been analyzed. If student preparedness numbers remain the same or decrease, additional effort will be made to insure student understanding of PSLOs. If the scores return to historical levels, the 2012/2013 results will be considered an anomaly and no additional actions will be taken.

5. Evidence of Student Learning

5.1 Summary of Department Discussions on Assessment Activities

Geomatics faculty met during convocation in September of 2012. Discussions at this meeting included a review of the department's mission statement, the educational objectives, and student learning outcomes. Faculty also reviewed decisions for program improvements that were published in the 2011/2012 assessment report. Faculty also met two more times during fall quarter to review a new six year assessment cycle for the department.

The most significant changes made by geomatics faculty to the GIS Option for this assessment cycle was switching from a three year to a six year assessment cycle and changing the PSLOs to match the ABET criteria utilized in the Surveying option. The PSLO outcomes for the survey option were changed in order to make it easier to meet ABET accreditation and to allow for more mutual assessment opportunities between the two programs.

5.2 Summary of Faculty Decisions on Program Improvements

The following is a summary of areas identified during this assessment cycle as areas than need additional monitoring or improvement:

PLSO(f)/ISLO (3) – "An Understanding of Professional and Ethical Responsibility". This PSLO was assessed by homework assignment in GIS 446 fall quarter, 2012. None of the performance criteria for this assessment were below the departmentally established

70% minimum, however two were at the 70% threshold. When students were asked to read an ethical case study and then describe the issues and the parties involved, 3 of the 10 students assessed with this assignment had trouble identifying the issues and the affected parties. Faculty believe that inclusion of additional professional ethics material in lower division course work (GME 161 – Plane Surveying I and GME 241 – Boundary Law I) will help improve these scores for GIS option students next year.

Senior Exit Survey - The 2012/2013 senior exit survey showed a dramatic drop in the number of respondents who felt that they were "Prepared" or "Well Prepared" for the PSLOs a through k. In the 2011/2012 senior exit survey, only one student felt "Somewhat Prepared" in PSLO(i) (knowledge of contemporary issues). In the 2012/2013 senior exit survey, at least three students identified that they were either "inadequately" or only "somewhat" prepared in PSLOs b, c, j, and k. Faculty considered the results of the exit survey and concluded that the results were most likely due to two factors. The first area is an inadvertent reduction in effort to connect classroom work with a-k outcomes. The two previous assessments had seen continuous improvement in senior exit survey results and the faculty may have become complacent in explaining student learning outcomes and relied too much on syllabus descriptions and homework instructions. Faculty will be vigilant during the next assessment cycle that PSLOs are more adequately discussed in class.

The second factor for the low scores is student driven. Most of the outcomes that fall below the required departmentally established level for this assessment most likely come from two students that experienced a great deal of difficulty in the program during their four years at Oregon Tech. One student in particular was advised after his first year in the program that he might consider other courses of study/career options as his expectations for the academic program and the surveying profession were unrealistic. Given the anonymous nature of the survey, there is no way to verify this supposition, but comments left in this section of the survey match closely with those already expressed publicly by the student in question.
Faculty will return to more discussion of the PSLOs in the classroom and will re-evaluate the scores during the next senior exit survey in spring of 2014. It is believed that the results of the 2013/2014 exit survey will meet or exceed those of 2011/2012 and demonstrate that the 2012/2013 results are an anomaly for the program.

6. "Closing the Loop" – Changes Resulting from Assessment

PSLO (1)/ISLO(2) – "Ability to work effectively in teams"

This ISLO was assessed in GME 426 spring quarter of 2012. Students scored very well all performance criteria except "ability to assume roles and responsibilities". As stated in the 2011/2012 assessment report, no specific actions were taken to address this issue. The instructor felt that it was more personality conflicts between the group members in the group that scored poorly than an overall failure of the students to understand the concepts of team work. This was verified in 2012/2013 assessment of PSLO (1) in GME 468. Most of the students who had taken GME 426 took GME 468 spring quarter of

2013. All students exceeded the 70% minimum in their “ability to assume roles and responsibilities”. No additional action will be taken on this item until it is re-assessed in the regular assessment schedule.

7. References

1. Oregon Institute of Technology. Institutional Research Home Page. June 9, 2011 <http://www.oit.edu/ir>

8. Appendices

Appendix A – SLO Curriculum Maps

PSLO Curriculum Map
2012/2013

PSLO (d)/ISLO(2): 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	
Winter	CIV 112		GME 242		GIS 205		GIS 446	
	GME 175		GIS 316		GIS 332		GME 452	
	GIS 105						GME 455	
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.

PSLO (f)/ISLO(3): Professionalism and Ethics.

	Freshman		Sophomore		Junior		Senior	
Fall	GME 161		GIS 306		GIS 446		GME 425	
	GIS 103		GME 241				GME 451	
Winter	CIV 112		GME 242		GIS 205		GIS 446	
	GME 175		GIS 316		GIS 332		GME 452	
	GIS 105						GME 455	
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.