COMMITTEE ON ACADEMIC PLANNING AND REVIEW
ANNUAL PROGRAM REPORT

College	CoS
Department	Earth and Environmental Sciences
Program Unit	Geology MS
Reporting for Academic Year	2016-2017
Department Chair	Jean Moran
Date Submitted	9/20/2017

1. SELF-STUDY (about 1 page)

A. Five-year Review Planning Goals

From the AY12-13 5 year review:
1. Curriculum
We plan to revise our curriculum during the next two years in response to the University's plan to move from the quarter system to the semester system by Fall 2018. This will require a thorough review of all courses and program requirements. Some courses will be expanded, others eliminated, and some redesigned as hybrid or online courses. We plan to redesign the Environmental Science BS program by combining the current options, to offer increased flexibility and choice for students in designing a program to fit their needs, and decreased time-to-degree.
2. Degree Programs
Continued growth of our programs and improved graduation rates would be stimulated by developing new courses in areas that provide students with practical skills in areas that are becoming increasingly important; these include spatial analysis, environmental monitoring, instrumental analysis, soil science, and engineering geology.
We may develop additional hybrid or online courses on topics such as pollution modeling.
3. General Education
Cluster proposals are normally solicited and approved about every three years; we anticipate that our participation in clusters will continue. We foresee a growing demand for General Education (GE) curriculum related to climate. We have accordingly prepared a new course proposal for a lower- division Environmental Science course on Global Change for non-majors that has been approved as a new course and for GE (area B3) credit.
4. Etc.
The top priority for future faculty hires is for an Environmental Scientist with a specialty in climate/global change and/or interactions between the hydrosphere, atmosphere and solid Earth. The second priority for a new faculty hire would be in the area of Environmental Geoscience with a focus on surficial processes.

Outside reviewer comment: My main recommendation emerged very clearly from my discussion with students, and to a lesser extent with faculty. I recommend the department work with Dean Leung to find a way to reinstate the summer geology field camp that the department conducted for many years.

B. Five-year Review Planning Goals Progress

(1) A huge amount of time and effort over the past two years went into curriculum design under semesters. The MS degree program was transformed to emphasize near-surface processes and a new name 'MS in Environmental Geosciences' has been proposed. New courses that emphasize professional ethics, professional certification, and field skills were added to the degree program. Students continue to engage in cutting-edge research with faculty.
(2) Courses in Soil Science, Engineering Geology, and Geographic Information Systems ('practical skills' areas noted in five year goals) have been approved for semesters.
Graduate student TAs teach laboratory sections in introductory geology courses.

(4) During AY 16-17, a new faculty member, with expertise in carbon cycling and biogeochemistry, joined the department. Another new faculty member, with expertise in sedimentology and paleoclimatology, will begin in fall of 2017. These two hires fulfill the five year planning goals. However, one faculty member left the department during AY 16-17.

The Instructional Support Technician position was filled in October, 2015 and vacated in March, 2017. The position will be filled by a new IST in October, 2017. The department was the only one in the CoS with an ASAII position; a reclassification of the position to ACAI based on expectations for required skills and abilities was put forward, and is being evaluated by HR.

C. Program Changes and Needs

Department faculty were actively involved in designing the renovated laboratory space in South Science, and are looking forward with great anticipation to the much-improved space for research. The space provides potential for collaboration within the department and with other departments in science, and opens possibilities for new, externally funded research. Office space for lecturers, TT faculty, and staff is lacking.

The department anticipates increased needs for instructional software and for other instructional equipment as instruction becomes centered around active and experiential learning. For example, faculty requests for portable air quality monitoring equipment and water quality monitoring equipment could not be granted this year due to budget constraints, and software licenses for EdGCM, MATLAB, ROCKWORKS, and AnalyzeIT, etc. will amount to at least $4,000 more than previously budgeted for software expenses. A2E2/EIRA has become an indispensable source of funds for field trip transportation and new equipment, and will continue to be relied upon under semesters, to fund a portion of the field courses, and to update aging equipment in instructional laboratories.
The department holds teaching & learning workshops with instructional faculty to move toward student-centered, active learning. Funds are needed for release time for coordination of these events, and travel to NSF-SERC (Science Ed Resource Center) workshops. Funds for marketing/outreach/recruitment to both the REHS concentration and the new Environmental Geosciences MS will be requested in the department budget.

The department plans to submit a proposal for a TT faculty search in AY 17-18. The curricular demands of the new concentration in Geoscience Education (which includes an Atmospheric Science course), and advances in inter-disciplinary approaches to the study of interactions between humans and the environment, call for a faculty member with expertise in these areas. Possible sub-disciplines include geostatistics, water quality and human health, air quality and atmospheric science, climate change and urban flooding & landslides, or the food-water-energy nexus.

2. **SUMMARY OF ASSESSMENT** (about 1 page)

A. Program Student Learning Outcomes

1. attain an advanced understanding of the relationship between geologic materials and their physical and chemical properties. (Geologic Materials)

2. collect, analyze, and interpret data using advanced discipline-specific methods, techniques, and equipment. (Data & Analysis)

3. critically analyze geological and environmental issues through the evaluation of current scientific literature, and present an argument clearly and persuasively in written and oral form. (Communication)

4. conduct geologic research, including preparation of a project or thesis; the result should be of high enough quality to be presented at a professional meeting. (Research)

5. understand geologic time, evolution, Earth's place in the Universe, and global-scale processes such as plate tectonics, earth systems interactions, and climate change. (Geologic Time)

B. Program Student Learning Outcome(s) Assessed

4. Research and 5. Geologic Time

C. Summary of Assessment Process

(4) Thesis and Project Research. The department requires students on the thesis and project tracks to carry out original research "the result of which should be of high enough quality to be presented at a professional meeting". All five department faculty are active in research and offer a range of research projects that elicit student participation. A survey was carried out to track presentations by MS students at professional meetings and publications in peer reviewed journals.
(5) Isotope Geochemistry. The assignment used for assessment is one of five homework/problem set assignments given throughout the quarter. Completion of the activity requires a thorough understanding of the 'age equation' and 'isochrons', which are used to calculate rock ages from isotope ratios and the half-life of the radioactive isotope applied. Radiometric dating allows quantitative assignment of ages to rocks and revolutionized the field of geology in the 20th century. The expository essay portion of the assignment requires knowledge of the assumptions used, and properties of, one of the most commonly applied isotope systems to date igneous rocks (39Ar/40Kr). The first five categories of the quantitative literacy rubric were used to evaluate student work on the problem set.

D. Summary of Assessment Results

(4) Students entering the M.S. program typically have not been involved in research during their undergraduate years. M.S. students become actively involved in research, typically during the second year, and at a higher level of intensity/time commitment if they are on the thesis track. Over the last 5 years, 15 students have presented their research findings at professional meetings, including all of the students who pursued the thesis option. Moreover, four students were first authors or co-authors on

journal articles in peer-reviewed publications, an additional indication that the research is of high quality. Students pursuing the project option do not typically present the outcome of their project at a professional meeting; however, that has been because of timing, logistical, or financial issues, and not because the project is not of high enough quality to be presented at a professional meeting. The program learning outcome centered around research is achieved at a level above and beyond the stated objective. The department faculty could consider raising the level of expectations or requiring oral presentation of project research (oral presentation and defense of thesis research is already required).

(5) Out of 20 possible, overall scores ranged from 13.5 to 18, with an average of 15.4 and standard deviation of 1.5. Five of eight students demonstrated at the least the basic level of competency in all areas of quantitative literacy. Only one student displayed an exemplary level in more than one area of quantitative literacy. A thorough mastery of advanced algebra, calculus, basic statistics, and graphing is an expected pre-requisite for the course, but some students lack the basic preparation and others have the necessary preparation but their quantitative skills are quite rusty. A knowledge of igneous processes such as cooling rates for different minerals and chemical composition of different minerals is also expected. Most students have a basic understanding of these concepts but many lack a deeper understanding of how these processes affect e.g., retention of parent or daughter elements. Understanding the assumptions inherent in using the age equation and isochrons is a critical to applying the mathematics and interpreting the result, and was evaluated via the problems and the essay. Only 2 students scored >1 on the 'assumptions' portion of the rubric.

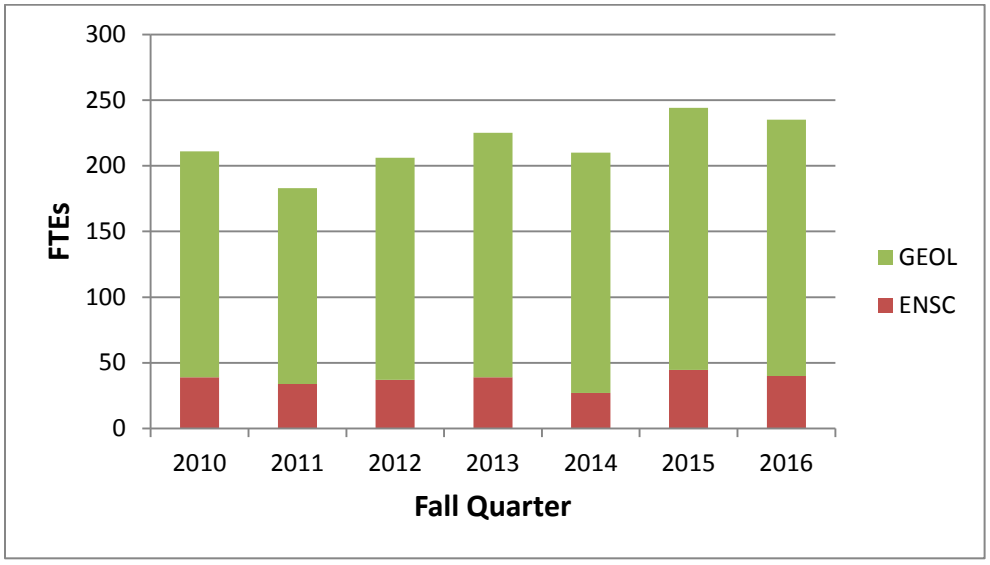
Possible ways to improve learning outcomes for this assignment are: 1)a pre-assignment that gives students practice with advanced algebra and graphing skills, 2)formal review of mineralogy and petrology with a focus on minerals and elements used in radiometric dating, 3)an additional, optional, session where students work on problems with the instructor present. In the future, similar assessment material will be assigned since calculating rock ages from isotopic data and isochrons is a key student learning outcome for this course.

3. STATISTICAL DATA (about 1 page)

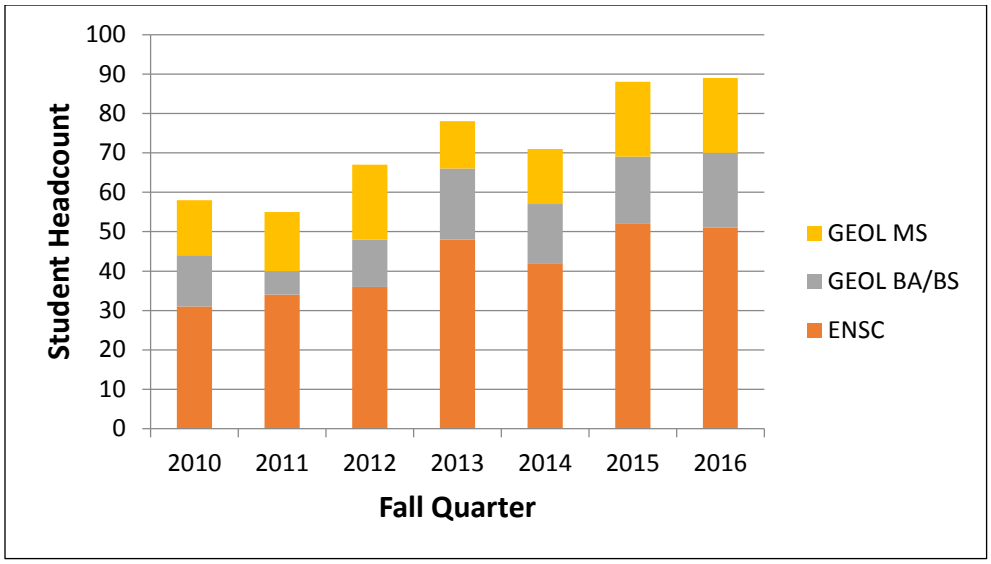
Please note: The Dashboard/Pioneer Data Warehouse does not show accurate data for Geology and Environmental Science. Some pages do not show both majors/degrees, some combine Environmental Studies and Environmental Science, etc. The faculty data are under the former (2005?) department name, Geological Science. A request to correct these problems resulted in some pages showing accurate data; however, several of the possible searches still exclude or misappropriate data.

Institutional Research, Analysis and Decision Support (IRAD) produces program statistics annually in standard format. These statistics (available on their page here) will be attached to the Annual Report of the Program Unit. This statistical document is expected to be approximately one page long and will contain the same data as required for the five-year review including student demographics of majors, student level of majors (e.g. Juniors, Seniors), faculty and academic allocation, and course data.

The Annual Report may include one or two pages of supplemental information, as appendices, in the form of graphical presentation (e.g., line graphs), tables, and pertinent discussion which summarize the data of the last several (3-5) years to make changes and trends more apparent.



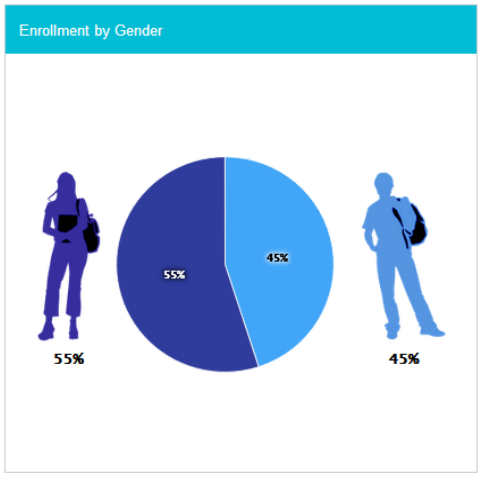
Enrollment in courses offered by the department as measured by Fall Quarter FTEs was 235 (not including self-support) for 2016, representing a small decrease from the previous year.

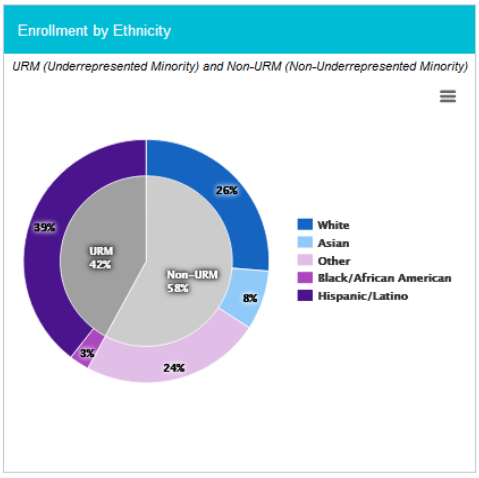


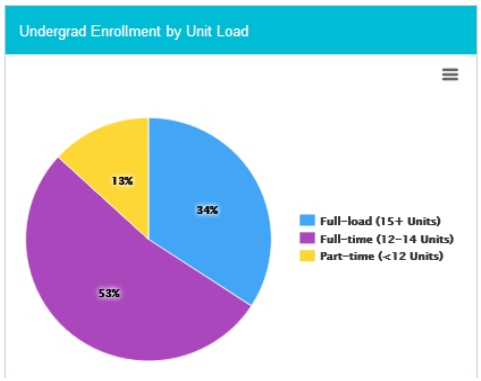
The total number of majors, or student headcount, in undergraduate (BS and BA) Geology programs is currently 19, a modest increase above the five-year average from 2010-2015. There were 7 students minoring in Geology in Fall, 2016. The number of Environmental Science majors was 51 in fall of 2016, almost the same number as the previous AY. The number of M.S. Geology students was 19 in fall of 2016, the same number as the previous AY. Four M.S. students graduated in AY 16-17.

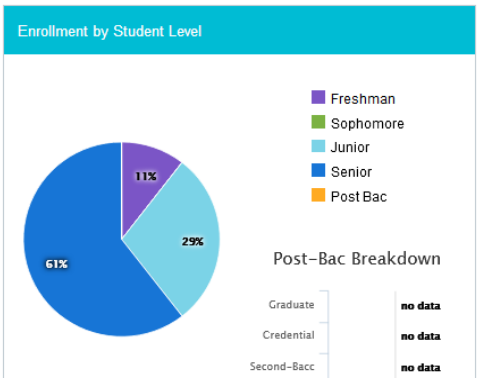
Appendix

Student data for ENSC B.S.

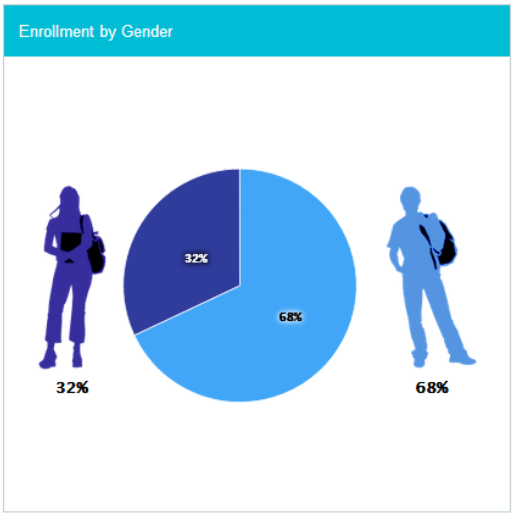


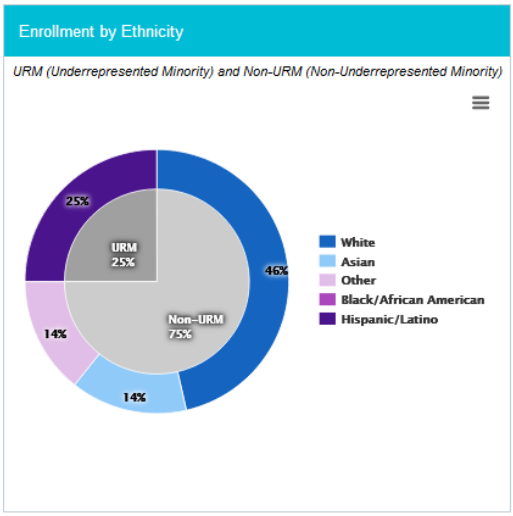


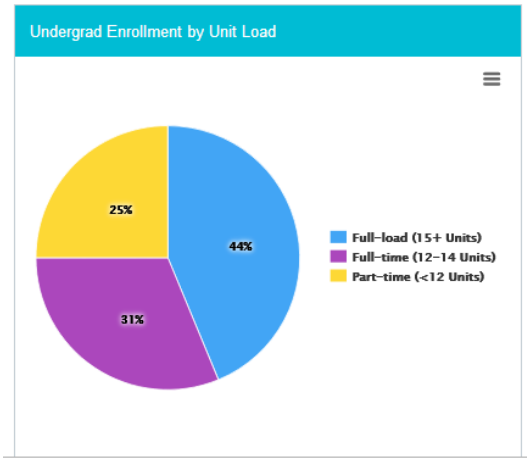


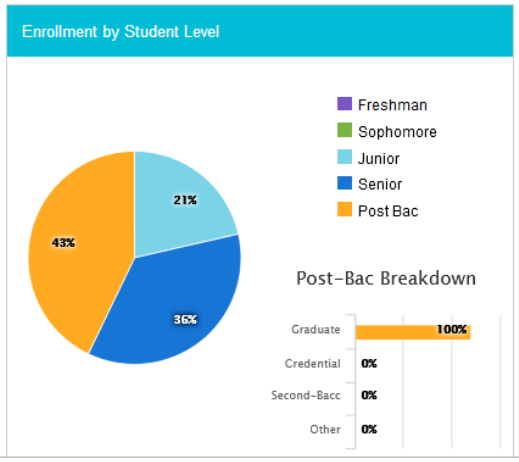


Student data for Geology (BS, BA, MS)









Geological Sciences		Headcount											
		Tenured and Tenure Track						Lecturer					
		Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016
STATUS	ETHNICITY												
Full Time	Black												
	Asian/Pacific												
	Hispanic												
	White	4	4	5	5	5	4						
	American Indian												
	International												
	Other						1						
	GENDER												
	Female	1	1	1	1	1	2						
	Male	3	3	4	4	4	3						
	SUB-TOTAL	4	4	5	5	5	5						
Part Time	ETHNICITY												
	Black												
	Asian/Pacific							1	1	1	1	1	1
	Hispanic												
	White							5	6	6	6	7	6
	American Indian												
	International												
	Other							2	2	2	2	1	1
	GENDER												
	Female							4	4	3	3	3	3
	Male							4	5	6	6	6	5
	SUB-TOTAL							8	9	9	9	9	8
DEPARTMENT TOTAL		4	4	5	5	5	5	8	9	9	9	9	8

California State University, East Bay

APR Summary Data

Fall 2011 - 2015

Geological Sciences					
	Fall Quarter				
	2011	2012	2013	2014	2015
A. Students Headcount					
1. Undergraduate	40	48	66	57	58
2. Postbaccalaureate	0	0	0	0	0
3. Graduate	15	19	12	14	17
4. Total Number of Majors	55	67	78	71	75
	College Years				
B. Degrees Awarded	10-11	11-12	12-13	13-14	14-15
1. Undergraduate	6	7	5	10	16
2. Graduate	0	2	5	1	8
3. Total	6	9	10	11	24
	Fall Quarter				
	2011	2012	2013	2014	2015

C. Faculty					
Tenured/Track Headcount					
1. Full-Time	4	4	5	5	5
2. Part-Time	0	0	0	0	0
3a. Total Tenure Track	4	4	5	5	5
3b. % Tenure Track	33.3%	30.8%	35.7%	35.7%	35.7%
Lecturer Headcount					
4. Full-Time	0	0	0	0	0
5. Part-Time	8	9	9	9	9
6a. Total Non-Tenure Track	8	9	9	9	9
6b. % Non-Tenure Track	66.7%	69.2%	64.3%	64.3%	64.3%
7. Grand Total All Faculty	12	13	14	14	14
Instructional FTE Faculty (FTEF)					
8. Tenured/Track FTEF	3.33	3.28	4.58	3.25	1.17
9. Lecturer FTEF	3.73	3.87	4.27	4	5.41
10. Total Instructional FTEF	7.07	7.15	8.85	7.25	6.57
Lecturer Teaching					
11a. FTES Taught by Tenure/Track	65.9	64.5	69.5	63.9	33.6
11b. % of FTES Taught by Tenure/Track	35.6%	31.1%	30.7%	30.2%	16.9%
12a. FTES Taught by Lecturer	119.2	143.3	157.1	147.7	165.2
12b. % of FTES Taught by Lecturer	64.4%	68.9%	69.3%	69.8%	83.1%
13. Total FTES taught	185.2	207.8	226.5	211.7	198.8
14. Total SCU taught	2752.0	3079.0	3377.0	3152.0	2959.0
D. Student Faculty Ratios					
1. Tenured/Track	19.8	19.7	15.2	19.7	28.8
2. Lecturer	31.9	37.0	36.8	36.9	30.6
3. SFR By Level (All Faculty)	26.2	29.1	25.6	29.2	30.2
4. Lower Division	30.9	35.3	24.7	25.2	32.1
5. Upper Division	25.5	35.0	29.9	35.9	29.2
6. Graduate	6.7	6.0	7.7	43.9	17.6
E. Section Size					
1. Number of Sections Offered	31.0	32.0	35.0	37.0	36.0
2. Average Section Size	30.1	34.9	32.1	29.8	29.8
3. Average Section Size for LD	34.3	36.1	33.3	28.8	31.6
4. Average Section Size for UD	26.4	35.3	34.2	34.7	29.6
5. Average Section Size for GD	14.0	14.0	10.0	14.0	15.0
6. LD Section taught by Tenured/Track	8	9	9	12	2
7. UD Section taught by Tenured/Track	2	0	7	0	4
8. GD Section taught by Tenured/Track	4	7	4	8	4
9. LD Section taught by Lecturer	8	6	9	7	15
10. UD Section taught by Lecturer	7	9	8	10	9
11. GD Section taught by Lecturer	2	1	0	0	2

Source and definitions available at: http://www.csueastbay.edu/ira/apr/summary/definitions.pdf

Appendix B. Assessment Materials

Geology M.S.
Program
ILOAlignment
Matrix

The table below shows which Institutional Learning Outcomes (ILOs) are addressed by each of the Program Learning Outcomes (PLOs) listed above.

	MS PLO 1 Geologic Materials	MS PLO 2 Data Analysis	MS PLO 3 Communication	MS PLO 4 Research	MS PLO 5 Geologic Time
ILO 1: Thinking &	X	X	X	X	X
ILO 2: Communication			X	X	
ILO 3: Diversity			X		X
ILO 4: Collaboration		X	X	X	
ILO 5: Sustainability			X		X
ILO 6: Specialized Education	X	X	X	X	X