University of Colorado at Colorado Springs – Natural Sciences

Contents

NATURAL SCIENCES

Anthropology, BA
Updated: Fall 2015
Chair: Linda Watts
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Part Two: Results of Assessment Activities

PSLO1: Be able to critically assess arguments in Anthropology, broadly.

      M1. Senior Seminar Paper Assignments[1]
      Rubric averages across three implementations (3 papers over the semester) showed improvement in Spring 2016 for every dimension of the senior seminar papers rubric for the second and third papers. For critical reading, averages progressed from 15 to15.8

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[1] Senior Seminar ANTH 4980, 3 to 4 paper assignments. Most senior seminars are taught by two anthropology faculty to ensure breadth of dialogue on various anthropological topics across generally two sub-disciplines; in this capstone course, generally 3-4 topical papers are submitted throughout the course based on senior level critical reading and in-class oral discussion. Students are evaluated according to a common rubric presented at the start of the semester.

to18 of 25 possible points. Integration of ideas: 13.3 to 15.8 to16 of 25 averages were earned. These two measures are appropriate to PSLO1. *These results also show improvement over aggregated student performance in 2014, at which time critical reading averages for the full semester were 14.4 and integration of ideas was 12.2.*

M2. Senior Seminar Research Project[2]
Should the senior research project be reflective of one paper and a presentation? Not the portfolio? Also, please see table sample above.

For fall 2015 senior seminar research papers showed improvement in total rubric scoring from the Draft to the Final papers on an average of 13%. All of nine students achieved improvement (6) or earned equal scores (3; 2 of these at 100%). With regard to Critical Reading scores on the rubric in particular, final papers showed an improvement from 15.6 to 18.8 average of 25. With regard to integration of ideas, averages improved from 16.25 to 17.7 from initial draft to final product.

M3. Exit Survey[3]
With regard to critical reading skills, students self-assessed their performance at the end of ANTH 4980 (combining fall 2014 and fall 2015) at an average of 4.2 of 5 scalar points (with little spread: one at 3, 3 at 5 and 6 at 4 of ten reported). Regarding self-assessment of integration of ideas skills, an average of 4.1 of 5 was reported, again with little spread.

Summary of PSLO 1 and Associated Measures

Rubric measures showed positive improvement over the course of a semester for ANTH 4980: Senior seminar in both the seminar (Sp '16) and research paper (F '15) delivery formats. At the same time, final averages in the rubric scores for ANTH 4980 of 18.8 /25 (=75.2%) for critical reading and 17.7 / 25 (=70.2%) for integration of ideas, respectively, certainly would indicate room for improvement programmatically. The exit survey results regarding how well students feel prepared with regard to critical reading skills and integration of ideas are both quite high (averaging 4.2 and 4.1 of 5 scale point scores, respectively). This either shows harshness in the rubric grading measures—which faculty would ascribe to—or a gross disparity in student self-assessments versus objective performance measures. One corrective lens would be to also collect faculty scoring that is not rubric based on the same papers, though those are aggregate grades not broken down according to specific measures. Recommendation is to discuss results with faculty in order to arrive at their overall impressions of results and recommendations.

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[2] Senior Seminar Capstone Research Project, ANTH 4980

Students in Senior Seminar, ANTH 4980, engage in an individual research project about which they both present orally in class at the end of the semester and submit a written research report. Since 2012, students may fulfill this same Measure by opting out of the general 4980 sections for an alternate section of Senior Seminar that emphasizes guided but independent research within any sub-discipline, supervised by a single faculty member. Students are expected to read broadly on the topic, and then to conduct in depth research on some aspect of it. They must present their findings both orally, using Power Point, and in written form. Students in both sections are evaluated according to a common rubric that they have access to before the class begins

[3] Senior Seminar Capstone Course Exit Survey, and Alumnae Contact Sheet. To be implemented Spring 2015.

PSLO2: Demonstrate understanding of theoretical positions influencing anthropological thinking in at least two sub-disciplines.

M1. Senior Seminar Paper Assignments
ANTH 4980 Rubric/ Knowledge of core concepts:
In Spring 2016, Senior seminar taught by Wynn and Dorne produced rubric results for knowledge of key concepts over the implementation/grading of three papers. Based on a 25-point maximum rubric score for this dimension, average scores proceeded from T1=14.2, to T2=15.8, to T3=17. Thus students gradually improved throughout the course on this dimension, from beginning at a 56% score, to 63.2% to a final average of 68%

M2. Senior Seminar Research Project
Rubric/Knowledge of Core concepts:
In Dr. Church's research paper version of Senior Seminar over Fall 2014, the overall average on this dimension was 15/25-=60%. In Fall 2015 for the same research paper section, Church reported a progression from first draft to final draft rubrics on this dimension of knowledge of core concepts from 14.1/25 = 56% to a final score average of 15 = 60%.

M3. Exit Survey
Core knowledge self-assessments:
ANTH 4980 Senior exit surveys (combining Wynn/Dorne and Church sections for Sp 2015 elicit self-assessed ratings for Knowledge of Core Concepts by sub-discipline. Averages were: Cultural Anthropology, 4.2/5 = 84%; Archaeology, 4.0/5 = 80%; Linguistic anthropology, 3.35 = 67%; Biological anthropology, 2.9 = 58%.

Summary of PSLO 2 and Associated Measures

As with PSLO1, on the dimension of knowledge of core concepts ANTH 4980 rubric measures are similar in results across both course formats (seminar; research paper development). In both formats students show improvement on this dimension, starting from an overall average baseline of 14.1/25 = 56% to a more advanced score of around 15 = 60%. Also in the same manner as with PSLO1, students' self-assessments of their knowledge of core subjects is much higher than these ANTH 4980 rubric averages would indicate, with an overall average in the Exit Surveys on this dimension of 72%. Breaking the latter down by sub-discipline knowledge, students self-assessed their knowledge of core concepts as highest in Cultural Anthropology and Archaeology (82% avg.) and lower in Linguistic anthropology (67%) and Biological Anthropology (58%). As with PSLO1, then, this may indicate harsh rubric scoring for the capstone ANTH 4980 class as compared with grading in other departmental curricula. It is useful to consider the students' measurement of their sub-disciplinary knowledge (which the rubric does not address apart from the team of teachers representing 2 of the 4 sub-disciplines), which this report addresses in the final summary.

PSLO3: Evaluate research strategies and construct arguments within at least two sub-disciplines.

> M1. Senior Seminar Paper Assignments
> Rubric: Handle data
> For Spring 2015 (Wynn/Dorne ANTH 4980 seminar), students showed a marked positive progression on rubric scores from the first to the second of three papers, from 12.5/25 (50%) to 17.5 (70%) to 17 (68%).

> M2. Senior Seminar Research Project
> Rubric: Handle data
> For Fall 2015 (Church ANTH 4980 research paper), students showed a progression in the rubric scores for "ability to handle data" from 12.5/25 (50%) on the initial paper to 17.5 (70%) on the final, revised paper. For Fall 2014 for this same class, Church reported an average summary grade for this measure as 15 (60%).

> M3. Exit Survey
> Ability to utilize data
> Watts/Dorne ANTH 4980 students from Spring 2014 self-reported an average score of 3.8/5 (76%) for the factor "Ability to utilize data" on the Senior Exit Survey. Combined Senior Exit Survey scores from Wynn/Dorne and from Church in Spring 2015 were self-reported at an average of 4.3/5 (86%).

Summary of PSLO 3 and Associated Measures

> For the factor of the capacity for evaluating research strategies we are using Senior Seminar rubric data on "handling data" and Senior Exit Survey data on "ability to utilize data". This in itself is an indirect assessment, as the ability to handle data as a researcher implies only loosely the ability to evaluate research strategies generally, but this is the closest rubric measure in terms of relevance to PSLO3. It is helpful to find that across both ANTH 4980 formats in Spring 2016 (seminar and research paper modalities), students showed a marked increase on this factor in their rubric scores and this shift was parallel across the two formats, progressing from roughly 50% to 70% on this one measure from early to late in this capstone experience course.

> Senior Exit Surveys from spring 2014 and from spring 2015 (combined) showed that students rated themselves generally on "ability to utilize data" higher than the final score averages indicated in the rubrics (at 76% and 86%, respectively). The latter reveals students feel confident with regard to this factor at the end of their Anthropology program. The fact that their initial rubric scores were only averaging at 50% (versus their relatively high self-assessment at the end of the semester), similarly as with PSLO's 1 and 2, again suggests that the rubric scoring especially for early papers may be overly harsh. Yet, the significant improvement over the course of the semester balanced by the self-reported assessments at the end after such improvements may indeed indicate a strong base of knowledge in this area overall within the program

PSLO4: Compare and contrast theoretical and methodological foundations for at least two of the four sub-disciplines.

M1. Senior Seminar Paper Assignments
Rubric: background research
For the rubric measure of "background research" over 2 papers from the middle to the end of ANTH 4980 Wynn/Dorne in Spring 2015, students showed an improvement from 16.7/25 (66.8%) to 19.2/25 (76.8%).
M2. Senior Seminar Research Project
Rubric: background research
For the rubric measure of "background research" as a summary average over the whole semester of ANTH 4980 Church Fall 2014, students earned an 18.8/25 (75.2%) average. For Fall 2015 of this same research paper based ANTH 4980, students overall made a slight improvement on this measure from 20/25 (80%) on the initial paper to 20.7/25 (82.8%). These latter data reflect, however, that only one student showed an improvement from 20/25 to 25/25; the rest earned 20/25 on both rubrics.

M4. In-class Presentation[4]
Spring 2013 Watts/Dorne ANTH 4980 students earned an average of 91% on non-rubric based grading of their in-class presentations (presenting overviews of assigned papers). This was an assignment (approx. 15 minutes) spread over the semester worth 20 points. Data have not been submitted for later classes on this measure apart from final paper scores already included on above measures.

M5. FCQ #2, ANTH 4980
For the standard FCQ questions for ANTH 4980, it would not be #2 (*personal interest before enrolled*) but rather #6 (*how much you learned in course*) that would have the closest indirect relevance to this PSLO.
Fall 2015 Church 4980/001: summary score of 5.7/ 6
Spring 2014 Larkin/Wynn ANTH 4980/001: summary score of 5.9/ 6

Summary of PSLO 4 and Associated Measures
Results on this rubric measure show validity across both class formats for ANTH 4980 from Fall 2014 through Spring 2015 for final averages of around 75%. This PSLO is closely related to PSLO2 although we are using different rubric measures for assessment. Using this measure shows a higher set of averages than with PSLO2 (roughly 60% at the end of Spring 2015 ANTH4980 using "knowledge of core concepts" as the measure).

PSLO5: Define and explain core concepts in all four sub-disciplines.

FCQ #1, ANTH 4980
For the standard FCQ questions for ANTH 4980, it would not be #1 (*hrs/week spent on course*) but rather #5 (*intellectual challenge of course*) that would have the closest indirect relevance to this PSLO.

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[4] See footnote 2 for information related to this measure.

Fall 2015 Church 4980/001: summary score of 6.0/ 6

Spring 2014 Larkin/Wynn ANTH 4980/001: summary score of 5.4/ 6

Exit Survey
Core knowledge self-assessment (N=20)
This measure was already assessed with PSLO2. Copying those results: *ANTH 4980 Senior exit surveys (combining Wynn/Dorne and Church sections for Sp 2015 elicit self-assessed ratings for Knowledge of Core Concepts by sub-discipline. Averages were: Cultural Anthropology, 4.2/5 = 84%; Archaeology, 4.0/5 = 80%; Linguistic anthropology, 3.35 = 67%; Biological anthropology, 2.9 = 58%.*

Summary of PSLO 5 and Associated Measures

Students rated ANTH 4980 as high (cum. average of 5.7/6 across classes measured) with regard to the FCQ question: "intellectual challenge of course". It is, of course, difficult to interpret that result with respect to the PSLO5 of "Define and explain core concepts in all four sub-disciplines." As well, the Senior Exit Survey which elicits self-reported scores on the measure of "knowledge of core concepts" is a general indicator rather than rubric based. The latter does ask students to break down this factor with respect to each of the four sub-disciplines, making it perhaps more relevant to this PSLO than to PSLO2 which addresses core knowledge in "at least two" sub-disciplines. There is an (additional) measure of competence regarding anthropological theories self-reported in our Alumnae Survey (2015), showing that 67% (2/3) of graduated majors report having achieved an Average to Above Average competence on this factor (33.33% above avg., 33.3% average, 33.3% marginal competence).

PSLO6: Develop strong written presentation skills for at least two sub-disciplines in Anthropology[5]

M1. Senior seminar paper assignments
Rubric: Clarity/Grammar
Spring 2015 Wynn/Dorne ANTH 4980 (seminar based) reported a gradual improvement in rubric scores for "clarity/grammar" over three papers from early to late in the semester, from 15.8/25 (63.2%) to 18.3 (73.2%) to 19 (76%).

M2. Senior Seminar Research Project
Rubric: Clarity/Grammar
Fall 2015 ANTH4980 Church (research based) reported a gradual increase on "clarity/grammar" rubric scores from averages of 17.5/25 (70%) to 20 (80%).

Summary of PSLO 6 and Associated Measures

These two measures both indicate a similar improvement over the course of the capstone course in Senior Seminar for this factor of clarity/grammar in (written) paper submissions for both formats of the course (seminar and research paper). As well, these scores

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[5] This was added by Linda Watts post submission and they still need to get together to tie it to their outcomes.

indicate resulting competence at a cumulative average of 78% for this dimension. Given the stringency by which rubric scores tend to be applied (as evidenced by above stated results throughout this document), this is a positive result for the Anthropology program overall

Other Indicators of Student Learning

Exit survey

Students responded (N=20) to a question in the Senior Exit Survey to a scalar question (1-5) about their perceived degree of feeling "well prepared to take your next step, whether by graduate study or a next career step based on your education in the UCCS Anthropology program." Results averaged 3.7 of 5.

Alumnae Survey

The Anthropology Alumnae survey (2015) asked alumnae about their perceptions of "preparation for post-graduate study and work." 100% of respondents(N=9) responded that retrospectively they felt the UCCS Anthropology curricula had prepared them well "for a career in Anthropology" and perhaps more significantly, 90% also said they felt the Anthropology program had prepared them well for "a job in another area."

Overall Summary of Assessment Results

- Added in-class presentation to 4980
- Continually updating theoretical approaches/ reading materials in 3970 (History of Anthropology)
- Added additional courses to count as fulfilling methods requirement
- Moved advanced lab tech class to Spring semester to precede summer field schools
- Added sustainability component to 1040 Spring 2015
- Senior Exit Survey first adopted Fall 2014 in 4980
- Rubric improvement since Fall 2014 for papers in 4980 (adding dimension of "clarity/grammar"
- Added careers material to 1040 since Spring 2015 (after results from alumnae survey 2014)
- Considerations based on current assessment results for moving forward:
- Change "threshold competency" language in assessment plan document (Use average %s instead)
- More connection w/ majors re. careers as well as how ANTH may be relevant to their lives after graduation
- Omit FCQs as measure altogether (unless adding specific q's)
- Continue with alumnae surveys and senior exit surveys
- Continue alumnae newsletter (update, manage more closely at dept.)
- More instruction/ courses needed in Linguistic Anthropology and Biological Anthropology.
- Omit PSLO5 from Assessment Plan unless we add other, more direct measures (such as qualitative responses—though indirect—in alumnae survey)

Biology, BS
Updated: Fall 2015
Chair: Jeff Broker
Assessment Coordinator: Lisa Hines

Part One: Assurance of Student Learning Plan

Mission Statement
> The mission of the Department of Biology is to provide excellent classroom teaching integrated with relevant research and practical experiences that will prepare students to be innovative and knowledgeable professionals in the biological sciences as well as critical thinkers and engaged citizens

Teaching Goals
> TG 1: Literacy in Biology: Students will possess the ability to utilize resources in the biological sciences in order to find, evaluate, and apply this information to address biological questions within the real world.
>
> TG 2: Proficiency in the Scientific Method: Students will be able to apply the scientific method to answer biological questions.
>
> TG 3: Content Knowledge: Students will be proficient in the techniques and practical applications of modern field and laboratory biology.
>
> TG 4: Effective Communicators: Students will be able to effectively communicate biological principles to both the scientific and non-scientific communities.

Program Student Learning Outcomes
> PSLO1: Students will know how to formulate a testable hypothesis, design and conduct scientific investigations, and use their knowledge of statistics to interpret study findings (M1, M2).
>
> PSLO2: Students will gain an understanding of the fundamental processes of cells that are interwoven within one large bio-chemical network. (M1, M2).
>
> PSLO3: Students will be able to: 1) understand, from a bio-chemical perspective, how genetic information is stored, expressed, and inherited, 2) explain the inheritance of patters of traits, and what factors influence the prevalence of traits, 3) utilize their knowledge to test, predict, and interpret experimental outcomes (M1, M2).
>
> PSLO4: Students will be able to identify the major classes of macromolecules, recognize the principal biosynthetic and energy-pathways of living organisms, and understand the connections between biological systems and the molecular structures of their constituent parts (M1, M2).

PSLO5: Students will be able to understand the factors that contribute to and the consequences of evolutionary change, and to apply "evolutionary thinking" to explain biological phenomena (M1, M2).

Measures
    M1. Pre/Post (Intro Bio II and Senior Seminar)
    M2. Senior Survey

Part Two: Results of Assessment Activities

The following results are based on Fall/Spring 2015-16 assessments completed by students enrolled in introductory-level biology (n=237) and senior seminar (n=118), which are core courses in the biology curriculum. The program assessment plan included a pre- (introductory-level students) and post-knowledge (senior-level students) assessment that contains 36 content-based multiple-choice questions, and a perception survey (senior-level students only). These findings are summarized below. The surveys and question alignment with PSLOs are provided for your reference.

PSLO1: Students will know how to formulate a testable hypothesis, design and conduct scientific investigations, and use their knowledge of statistics to interpret study findings.

Pre/Post (Intro Bio II and Senior Seminar)
Over the past two years, the Biology Department implemented a new program assessment strategy. We now use a validated multiple-choice assessment survey that was developed by CU-Boulder, with some additional questions that were developed by faculty members in the Biology Department. The limitation with this new survey tool is that it does not include questions that specifically evaluate hypothesis testing and data interpretation. We recently developed and piloted two intentionally challenging questions that address PSLO 1, however, the questions need to be re-evaluated due to confusion and poor performance among the students. Thus, the results for PSLO1 are based on just one question, so these findings must be interpreted cautiously.

Based on our Fall/Spring 2015-16 assessments, only 22.4% of introductory-level students got the one PSLO1 question correct compared with 63% of senior-level students. Based on this one question, senior-level students achieved the benchmark (more than 60% answered correctly) for

Senior Survey
According to the responses given on the Senior Survey, senior-level biology majors feel confident in their abilities to accomplish the objectives related to PSLO1. Some key points to note are that 91% of students felt as though they got adequate experience interpreting scientific literature and 89% felt the same for interpreting scientific experiments. In addition, 78% felt that they got adequate experience generating scientific hypotheses and 73% felt the same when it came to formulating their own science-related

ideas. Another response to point out is that 73% felt as though the program built confidence in their abilities to perform laboratory experiments and research.

Overall Summary of Findings for PSLO1 and Associated Measures

Overall, the majority of senior-level biology majors percieved that they are getting adequate experience and training in the scientific method (PSLO1) and feel confident in their abilities. The knowledge survey also supports this, since we did meet our benchmark of 60% answering correctly.   However, the knowledge data need to be interpreted cautiously due to the lack of knowledge-based questions that address PSLO1.

Potential action plan…

As previously discussed, we need to adopt additional knowledge-based questions that address PSLO1. Biostatistics is now incorporated on standardized tests for various graduate programs, such as the MCAT, so we will explore this as a means to obtain validated questions that are relevant to student success after graduation.

PSLO2: Students will gain an understanding of the fundamental processes of cells that are interwoven within one large bio-chemical network.

Pre/Post (Intro Bio II and Senior Seminar)
Introductory-level biology students have some basic knowledge of the fundamental processes of cells. The average score on the questions relating to PSLO2 was 40.5%. Only 4 out of the 25 questions had an average higher than 60% correct (benchmark).

In comparison, senior-level biology students performed substantially better than the introductory-level students, demonstrating that they have a good understanding of the fundamental processes of cells. Their average score on questions related to PSLO2 is 61.1%. On 18 of the 25 questions, more than 60% (benchmark) of the students answered correctly. Two of the questions were in the 50% range, and the remaining four questions were less than 50%.

Senior Survey
According to the responses given on the Senior Survey, senior-level biology majors feel confident in their abilities to accomplish the objectives related to PSLO2. A key point to make is that 85% of students correctly disagreed with the statement that all living systems are autonomous (self-sufficient and are not interconnected), while 95% agreed with the statement that basic units of structure define all living things.

Overall Summary of Findings for PSLO2 and Associated Measures

Overall, the biology program is successful in providing a strong understanding of the fundamental processes of cells that are interwoven within one large bio-chemical network. We met our benchmark of 60% answering correctly for 72% of the questions related to PSLO2, with an average of 61.1% among all questions. Responses on the senior survey demonstrate that student perceptions also support this.

Potential action plan…

> During the next assessment cycle, we will explore the few questions that senior students performed poorly on and identify ways to better address these concepts in other courses. The assessment questions were obtained from a validated survey developed by CU-Boulder, so we will compare with published data using other student populations.

PSLO3: Students will be able to: 1) understand, from a bioCHEM ical perspective, how genetic information is stored, expressed, and inherited, 2) explain the inheritance of patterns of traits, and what factors influence the prevalence of traits, 3) utilize their knowledge to test, predict, and interpret experimental outcomes.

> Pre/Post (Intro Bio II and Senior Seminar)
> Introductory-level biology students have a very limited understanding of fundamental concepts related to molecular biology and genetics. On average, students scored 33% on the questions relating to PSLO3. On all 15 questions related to PSLO3, less than 60% of students were able to answer correctly. There were three questions in the 50% range, and all the rest were less than 50%.

> In comparison, senior-level biology students performed substantially better than the introductory-level students, demonstrating that they have a good understanding of the basic concepts related to genetics. Their average score on questions related to PSLO3 is 58%. On ten of the 15 questions related to PSLO3, more than 60% of the students answered correctly. Two of the questions were in the 50% range, and the remaining three questions were less than 50%. Some questions on the survey relate to multiple PSLOs, and the questions that did not meet our benchmark PSLO3 were the same questions that scored low on PSLO2.

> Senior Survey
> According to the responses given on the Senior Survey, senior-level biology majors feel confident in their abilities to accomplish the objectives related to PSLO3. On the questions pertaining to PSLO3 that were present on the Senior Survey, students responded above 68% in all of the categories. A key point to make is that 98% of them agreed that the growth and behavior of organisms are influenced by genetic and environmental factors, and 89% of them agreed that basic research using simple model organisms' benefits society.

Summary of Findings for PSLO3 and Associated Measures

> Overall, the biology program is successful in providing a solid foundation in concepts related to PSLO3. We met our benchmark of 60% answering correctly for 67% of the knowledge questions related to PSLO3, with an average of 58% among all questions. Responses on the senior survey demonstrate that student perceptions also support this.

Potential action plan…

> As stated previously, we will explore the few questions that senior students performed poorly on and identify ways to better address these concepts in other courses. The

assessment questions were obtained from a validated survey developed by CU-Boulder, so we will compare with published data using other student populations.

PSLO4: Students will be able to identify the major classes of macromolecules, recognize the principal biosynthetic and energy-pathways of living organisms, and understand the connections between biological systems and the molecular structures of their constituent parts.

Pre/Post (Intro Bio II and Senior Seminar)
Introductory-level biology students have a very limited understanding of fundamental concepts related to bio-Chemistry. On average, students scored 48% on the questions relating to PSLO4. On four of the 15 questions related to PSLO4, more than 60% of students were able to answer correctly. There were three questions in the 50% range, and all the rest were less than 50%.

In comparison, senior-level biology students performed substantially better than the introductory-level students, demonstrating that they have a good understanding of the basic concepts related to bio-Chemistry. The average score on questions related to PSLO4 is 66%. On eleven of the 15 questions related to PSLO4, more than 60% of the students answered correctly. One question was in the 50% range, and the remaining three questions were less than 50%. Once again, the questions that did not meet our benchmark were questions that were related to other PSLOs.

Senior Survey
According to the responses given on the Senior Survey, senior-level biology majors feel confident in their abilities to accomplish all of the outcomes described in PSLO4. Of the questions pertaining to PSLO4 that were present on the Senior Survey students responded with above 86% agreeance to all of them. One key point to note is that 95% of students agreed that the basic units of structure define the function of all living things.

Overall Summary of Findings for PSLO4 and Associated Measures
Overall, the biology curriculum is successful in providing a solid foundation in bioChemistry, i.e., concepts related to PSLO4. We met our benchmark of 60% answering correctly for 73% of the questions related to PSLO2, with an average of 66% among all questions.   Responses on the senior survey demonstrate that student perceptions also support this.

Potential action plan…
As stated previously, we will explore the few questions that senior students performed poorly on and identify ways to better address these concepts in other courses. The assessment questions were obtained from a validated survey developed by CU-Boulder, so we will compare with published data using other student populations

PSLO5: Students will be able to understand the factors that contribute to and the consequences of evolutionary change, and to apply "evolutionary thinking" to explain biological phenomena.

Pre/Post (Intro Bio II and Senior Seminar)
Introductory-level biology students have a very limited understanding of fundamental concepts related to evolution. On average, students scored 35% on the questions relating to PSLO5. On all of the 7 questions related to PSLO5, less than 60% of students were able to answer correctly. There were two questions in the 50% range, and all the rest were less than 50%.

In comparison, senior-level biology students performed better than the introductory-level students, demonstrating that they have a stronger understanding of concepts related to evolution. Their average score on questions related to PSLO5 is 49%. On 3 of the 7 questions related to PSLO5, more than 60% of the students answered correctly. One question was in the 50% range, and the remaining three questions were less than 50%.

Senior Survey
According to the responses given on the Senior Survey, senior-level biology majors feel confident in their abilities to accomplish all of the outcomes described in PSLO5. A keynote to make is that 86% of students agreed that the diversity of life evolved over time by processes of mutation and selection.

Overall Summary of Findings for PSLO5 and Associated Measures
Our assessment data indicate that biology majors generally have a good understanding of the outcomes associated with PSLO5, although it is not as strong as other PSLOs.   This is expected due to program changes, which no longer requires that all majors take the evolution course. Students who opt in to the biomedical option, representing roughly half of all biology majors, are not required to take evolution as part of the core curriculum. These students will get a basic introduction to this topic in other core classes, but there is no in-depth discussion on this topic.

Potential action plan…
We will review these questions to see how these concepts can be integrated better into other core courses. We may consider revising this PSLO given that evolution is no longer a core course in the biology curriculum

PSLO6: Students will be able to apply their understanding of fundamental biological concepts in order to translate and communicate the scientific literature.

Senior Survey
According to the responses given on the Senior Survey, senior-level biology majors feel confident in their abilities to accomplish all of the outcomes described in PSLO6. Approximately 88% felt that they gained sufficient or extensive experience with

communicating biology principles to others, and 93% felt that they gained sufficient or extensive experience with interpreting the scientific literature.

Senior Seminar Rubric
Across all senior seminar sections during spring 2016, 9 out of 67 students scored less than 16 (out or 21 total possible points). Among those that scored less than 16 (benchmark score), all of these students received a score of 1 ("below average") within one of the areas listed on the rubric, reflecting that 16 is an ideal benchmark for this assessment. Overall, 86.5% of students achieved this benchmark.

The senior seminar rubric was first piloted by faculty members who were teaching BIOL 4010 (senior seminar) during spring 2016. Overall, there were no major issues with implementation. There was one suggestion, which was to remove "Supporting Materials" due to percieved overlap with "Subject/Content Knowledge". This heading has been removed from the revised rubric that will be implemented in fall, 2017. As a result, there were be a total of 18 possible points, and the benchmark will be lowered to 13.   In spite of the different teaching formats across the sections, the student averages among the different sections were fairly similar. This provides reassurance that the expectations do not vary dramatically across the different sectionsv (instructors). Overall, these data reflect that students are accomplishing learning objectives desired with PSLO6.

Potential action plan…
The implementation of the senior seminar rubric has helped to improve consistency across the different seminar sections. While the overall goals for the course are generally consistent, there was concern regarding any discrepancies with respect to expectations. The rubric has initiated discussions among faculty with respect to what exactly are the expectations are for this particular course, and hopefully, this will help to enhance the efficacy of this capstone course within our curriculum.

Other Indicators of Student Learning
-Admission to Graduate School. This is determined based on their response to the senior survey, as well as by word of mouth. Students who share their success with a faculty member are typically reported to Dr. Berry-Lowe, who will then post their name and future program on the biology bulletin board.

A total of 13% of students who participated in the senior survey reported being accepted to graduate school at the time. We also had 22% who were in the process of applying and the majority, 53%, planning to apply in the future. Also, 35% had plans to pursue a career in a STEM field (including health professionals), and 70% had plans to pursue a postgraduate education in a STEM field (also including health professionals). We also had 44% of students respond that they plan to pursue a career that involves research.

-Faculty/Student research and publications. This is determined based on their response to the senior survey, as well as by word of mouth. The senior survey asks questions regarding their interactions with faculty, including participation in research.

Undergraduate research is an integral step in promoting research careers in young students. Approximately 23% of students had reported being involved with research by the time they are set to graduate. 15% of students had performed research in one of our professor's labs, while 8% had performed research either in a hospital setting or elsewhere.

While these numbers may sound low, it is actually quite high considering the faculty-student ratio in the Department. Faculty interaction is also an integral part of having a successful undergraduate experience and of our graduating class 56% of them felt as though their undergraduate coursework overall (lab and lecture courses) provided them opportunities to directly communicate with the faculty.

An important point to make is that 87% of senior-level students felt well-prepared in the biological sciences, a strong indication that our program is successfully producing satisfied graduates who feel confident in pursuing their future endeavors.

Overall Summary of Assessment Results

Over the recent years, the biology program has made multiple changes to improve students learning. These include:

1) Two years ago, we offered four biology concentration options (organismic, molecular & cellular, human, and exercise physiology). Given the large number of majors and the relatively few number of faculty members, we decided that it would be a better use of resources to have one general biology degree that provides an overview of biology-related topics. For those who have a strong interest in the biomedical profession, (e.g. doctor, physical therapy, etc.) students can opt into the biomedical sciences option.

Within this option, students are focused on coursework that emphasizes the human body. Efforts are now more focused specifically on these two tracks, which has enhanced the quality of the curriculum.

2) We have integrated a research-based experience into the second semester of the introductory-level biology laboratory course. This revision provides students with more hands-on activities and critical thinking skills in areas that are directly related to all of these PSLOs. With over 800 majors, it is not feasible to give every biology major an independent research experience with a faculty member, so we incorporated a research experience into an existing course.

3) We have dramatically revised our assessment plan in order to provide more meaningful data for enhancing the biology program. We now include a perception survey and use a validated knowledge survey. We developed an assessment tool for

assessing senior presentations, a component that has been lacking from our assessment plan.

4) We have acquired new technologies and resources to enhance the learning experience in various courses, such as video capabilities in Anatomy and Physiology and fluorescence microscopes for the introductory-level biology course. These advanced technologies help to prepare our students for the professional workforce by providing them with the necessary 21st century skills.

Biology, MSc
Updated: Fall 2015
Chair: Jeff Broker
Assessment Coordinator: Sandy Berry-Lowe

Part One: Assurance of Student Learning Plan

Mission Statement
It is the mission of the College of Letters, Arts and Sciences to:
-Provide collaborative programs that enrich the community
-Promote the creation of a vibrant and creative cultural life
-Strengthen and sustain a productive and responsible economic sector
-Facilitate the solution of community and region problems
-Increase the safety, health and welfare of individuals and groups
-Advance an understanding of the human condition and the natural world
-Sustain scientific and technological innovation
-Enhance the understanding and practice of civic duty and responsibility.

Teaching Goals
TG 1: Career Preparation: The student should be prepared to enter a PhD program or non-academic position. Be able to conduct original research. Demonstrate the ability to apply knowledge of biology. Recognize the need to engage in life-long learning.

TG 2: Active Member of Professional Community: The student should be prepared to become an active member of their professional community. Demonstrate knowledge of contemporary biological science issues and an understanding of professional and ethical responsibilities.

Program Student Learning Outcomes
PSLO1: Students will demonstrate a Master's level of knowledge of the major theories and concepts in one of the following areas: bio-Chemistry, genetics, molecular biology, exercise physiology, exercise science, nutrition, statistics, epidemiology, organismic biology (M1, M2, M3, M4, M5).

PSLO2: Students will demonstrate a Master's level of knowledge of the scientific method and be capable of critical thinking. That is, demonstrate an understanding of, and the ability to apply, the fundamentals of research methodology and statistical analysis to the interpretation and evaluation of scientific data and research reports (M1, M2, M3, M5).

PSLO3: Students will demonstrate a Master's level of knowledge of written communication skills. That is, demonstrate the ability to communicate knowledge in writing (M1, M2, M4, M5).

PSLO4: Students will demonstrate a Master's level of knowledge of oral communication skills. That is, demonstrate the ability to orally communicate knowledge effectively (M1, M3, M4, M5).

Measures

M1. Proposal Presentation

M2. Thesis or Research Paper – written

M4. Exit Interview

M5. Student Evaluation of Program

Part Two: Results of Assessment Activities

PSLO1: of the major theories and concepts in one of the following areas: bio-Chemistry, genetics, molecular biology, exercise physiology, exercise science, nutrition, statistics, epidemiology, organismic biology.

Proposal Presentation
6 new students: 3 were rated 3.0, 2 rated 2.5, and 1 rated 2.0

Thesis or Research Paper - written
2 thesis students rated 3.0 for knowledge; 1 capstone student rated 2.0 for knowledge

Thesis or Research Paper – oral
2 theses and 1 capstone student, all rated 3.0 for knowledge

Exit Interview
The 3 graduating students: One self-reported as average and 2 evaluated themselves as excellent when asked if they had 'Master's level knowledge in your specific discipline of biology'.

Student Evaluation of Program
The 3 graduating students all reported increased knowledge in their field.

Summary of Findings for PSLO1 and Associated Measures

The 3 graduating students all reported increased knowledge but 1 recommended increasing interdisciplinary communication (with Engineering and Health Sciences) and another strengthening graduate level statistics course offerings. The Department of Biology has tried but has had difficultly successfully communicating with both cited departments, at least partly due in part to differences in culture. And the reality is that our resources are too limited to expand our course (statistics) offerings or to establish new options.

The capstone option is a new option designed for students that cannot devote the time to research required for the thesis. The 1 capstone student stated that she had increased knowledge and did not think the program was lacking in any way yet she rated herself consistently lower on the exit interview self-evaluation questions compared to the 2 thesis (and male) students. This may be expected of students selecting the capstone option; more data will be required before attributing this effect to time invested in the program vs gender.

The department would like to offer graduate-only courses, but at this time resources and LAS policies limit us to offering all graduate courses as cross-listed undergraduate (4000-level) – graduate (5000-level) courses.

PSLO2: of the scientific method and be capable of critical thinking. That is, demonstrate an understanding of, and the ability to apply, the fundamentals of research methodology and statistical analysis to the interpretation and evaluation of scientific data and research reports.

Proposal Presentation
6 new students: 3 were rated 3.0, 2 rated 2.5, and 1 rated 2.0

Thesis or Research Paper - written
2 theses and 1 capstone student, all rated at 3.0

Thesis or Research Paper – oral
2 theses and 1 capstone student, all rated at 3.0

Student Evaluation of Program
The 3 graduating students all reported increased understanding, and usefulness, in using the scientific method to approach their research

Summary of Findings for PSLO2 and Associated Measures

One purpose of the proposal presentation is for new students to think critically about and plan how to carry out research following the scientific method. Methods are discussed in the proposal presentation and the student gains useful and immediate feedback from the audience. The student must be able to justify the proposed research and potentially modify the methods in response to input from the audience.

More valuable feedback is gained from the graduating students. Of the 3 graduating students, all all report that the scientific method clearly was important in planning and carrying out their research and that the program. The 3 also felt that after completing the MSc, they were prepared to use critical thinking to address further research questions. One student wrote: "Creating a study, following the procedures to get specific data and having to both defend and publish the findings was very valuable to understanding the scientific method." And "I have always been a critical thinker but this program helped me advance these skills to become more effective at addressing problems and questions." The consensus of the department is that this PLSO is being adequately addressed.

PSLO3: of written communication skills. That is, demonstrate the ability to communicate knowledge in writing.

Proposal Presentation
6 new students prepared outlines of their proposal presentation and all have begun a literature review as one pre-requirement for the presenting their proposed research.

Thesis or Research Paper - written
Of the 3 graduating students, all were rated 3.0 for their writing.

Exit Interview
The 3 graduating students confirmed that their ability to communicate effectively (written) was above average (2 students) or excellent (1 student).

Student Evaluation of Program
The 3 graduating students confirmed that the program had increased their written communication skills

Summary of Findings for PSLO3 and associated findings
As part of the preparation for the proposal presentation, the new students prepare outlines of their proposed work. The students are also required to begin a literature review so they can introduce their proposed research in a logical context
.
At the end of the program the students can effectively communicate through writing. Writing comes from practice and students practice writing in some courses, in writing the literature review and in writing the final thesis or capstone paper. One student stated "The input from my thesis committee and professors was invaluable." Another stated "I was taught to be much more informative and better introducing my ideas. I had a problem with being too concise and expecting the reader to know what I was thinking. I now am aware or how to better introduce and explain my topics/arguments."

It may be useful for the program to ask the committee for a writing evaluation of the student's proposal outline and draft literature review at the time of the proposal presentation. This will be discussed at the next semester biology graduate faculty meeting

PSLO4: of oral communication skills. That is, demonstrate the ability to orally communicate knowledge effectively.

Proposal Presentation
Of the 6 new students, the oral presentation was a significant second semester milestone. 3 students were rated 3.0 for delivery and use of communication aids, 1 was rated 2.0 for delivery and 3.0 for use of communication aids, 1 was 3.0 for delivery and 2.0 for communication aids, and a 4th was rated at 2.0 for both of these measures.
Thesis or Research Paper – oral
Of the 3 graduating students, all were rated at 3.0 for their oral presentation.

Exit Interview
The 3 graduating students, one rated themselves as below average in effective oral communication and two rated themselves as excellent.

Student Evaluation of Program
Of the 3 graduating students, 2 stated that the program increased their oral communication skills.

Summary of Findings for PSLO4 and Associated Measures
The current process for evaluating the new student's proposal presentation is adequate. Both the committee, and any faculty attending the presentation complete evaluations using the (attached) rubric.

Two of the 3 graduating students self-evaluated as excellent in oral communication and 1 as below average. One student that self-evaluated as excellent stated that the program did not increase his oral communication ability. This student stated: "No, there really weren't oral presentations to develop that, but I don't know that my oral presentation skills were the most important skills for me to hone." The second student that self-evaluated as excellent and also stated that the program did increase his skills, stated: "Yes; having to explain my study to many different participants and also presenting my finding during my defense challenged my communications and effectively strengthened my skills." The 3rd student self-evaluated as below average in oral communication skills and when asked if the program increased her communication skills stated: "Yes. Any remaining shortcomings are my own."

Other Indicators of Student Learning
Tracking of alumni. That is, personal communication with alumni will allow biology to track MSc graduates' ability to effectively compete in the job market and gain entrance into professional and graduate schools. Biology faculty, including MSc advisor, are often in contact with post-graduates and consequently know their employment/education status.

Nine students were accepted into the program for the fall of 2015. Six completed the major milestones required, including the proposal presentation. Two are in the process and one student has been removed from the program due to not meeting the milestones

and not communicating with the MSc Program director and Major Advisor. The program may need to be more careful in accepting students that may have not be successful.

Of the 3 graduating students, one is a career military student, one has been accepted into an international Ph.D. program and the third, the capstone student, is attending to family matters and is currently looking for a job.

Tracking of awards, grants, publications by students enrolled in the MSc Biology program and their faculty advisors.

One of the new students has presented her initial research at an international meeting (May 2016). And 2 students have manuscripts in preparation as of this writing.

Summary of Assessment Results

The graduate faculty of the Department of Biology is consistently working to improve the MSc program in Biology. Although the Graduate Program Director handles the majority of administrative workload, the graduate faculty regularly provides input through meetings, surveys, and votes. The MSc in Biology has one required course is BIO 5010, which guides student through the milestones leading up to and including the proposal presentation.

Faculty agree that this course has helped to keep students on track. The faculty has also discussed adding a literature based, graduate-only level course to enhance the graduate experience. Unfortunately, the diversity in our options (e.g., ecology vs exercise science) makes it difficult to offer a single course that would meet the wide interests of our students and still meet the minimum enrollment numbers required by LAS.

Additionally, faculty are teaching at capacity thus it is not clear who would teach this class. The biggest problem the faculty has identified is the overall quality of our program. Without graduate-only courses, our program is below the standard that the faculty expect. A few faculty provide solid research experiences for students and are able to fund them off grants, but this is not the norm. Many students have to fund their own education, includig their thesis research.

On a positive note, financial support in the form of graduate teaching assistantships from the college is now being provided for 8 students. This an excellent step in the right direction and we hope this support will continue. At the next graduate program meeting, we plan to discuss options on how to improve students' oral communication skills and how to evaluate the writing ability of the potential students during the application process.

Chemistry, BABS
Updated: Fall 2015
Chair: Dave Anderson
Coordinator: Al Schoffstall
Part One: Assurance of Student Learning Plan

Program Student Learning Outcomes

>PSLO1: A basic knowledge of CHEM ical principles and an advanced knowledge of each of the major Chemistry sub-disciplines, including organic Chemistry, inorganic Chemistry, analytical Chemistry, physical Chemistry and bioChemistry (M1, M2, M3, M4).

>PSLO2: Knowledge of laboratory techniques and methodology and knowledge of CHEM ical instrumentation such that students are able to use their laboratory expertise to conduct independent laboratory work (M3, M4, M5).

>PSLO3: The ability to communicate CHEM ical knowledge effectively based on searching and analyzing the original journal and review literature in one or more of the main Chemistry sub-discipline (M3, M4, M5).

Measures

>M1. ACS Exams
>M2. ACS Duck Exam
>M3. Senior Survey/CHEM   4911
>M4. CHEM   3211 Survey
>M5. Portfolio

Part Two: Results of Assessment Activities

PSLO1. A basic knowledge of CHEM ical principles and an advanced knowledge of each of the major Chemistry sub-disciplines, including organic Chemistry, inorganic Chemistry, analytical Chemistry, physical Chemistry and bioChemistry

>ACS Exams (Appendix A: (Scantron summary forms)
>CHEM   3201-3211 Organic Chemistry (majors) ACS Exam
>2016 Exam Raw score 48.1 (17 students) 2016 Percentile score 77th (based on avg. percentile of the 2004, 2008 and 2012 norms. The 2016 exam has not been normed.)
>CHEM   1511 General Chemistry II (majors) ACS Exam
>2008 Exam Raw score 41.6 (16 students) 2016 Percentile score 72nd
>CHEM 4311 Inorganic Chemistry (B.S. students)
>2002 Inorganic Exam Raw score 26 (4 students) 2016 Percentile 65th

>ACS DUCK Exam (Appendix A: Scantron summary forms))
>CHEM   4911 Chemistry Capstone DUCK Exam
>2008 Exam Raw score 36 (8 students) 2016 Percentile score 70th

Senior Survey/CHEM 4911 (Appendix B)
Average of questions 1-4 (70%) covering knowledge on the senior survey
Surveys Fall 2015 for CHEM 3201, 3202, 3203, 4001, 4101 & 4102
Surveys Spring 2016 CHEM 3211, 4011, 4501, 4511, 4521, 4601 & 4911, 4921 (Table 1, fall 2015; Table 2, spring 2016)

Refer to Tables 1 and 2 for data for fall 2015-spring 2016 (electronic attachments). The survey questions for the different courses are attached following Table 2.
ACS Exam policies (Exam questions are not attached.)

The ACS exam and the DUCK exam are kept under lock, but are available to those who qualify as having a need to know the content of these exams. The content is confidential and is not to be shared except in a very general way.

Summary of Findings for PSLO1 and Associated Measures

The ACS and DUCK exam data (forms scanned in Appendix A) show that students are performing well above the national average on the organic ACS exam, the General Chemistry exam and the DUCK exam, indicating a general consistency of scoring levels of students in our programs. The numbers are essentially the same as the spring 2015 results. This indicates that the scientific knowledge gained by students in our programs matches or surpasses that of comparable students elsewhere at the same level of development. The DUCK exam, in particular, is relevant to PSLO1 because the exam questions address all of the major sub-areas of Chemistry in a direct, summative fashion.

The questions on the General Chemistry exam all pertain to PSLO1. Therefore, the score as a whole is a measure of PSLO1 Interestingly the most missed question relates to a real world fact: Question 32, 15 of 16 students did not know that AgCl is insoluble in water! The next most-missed question, #45, is on Lewis acid-base theory for metal ions.

Students struggle with the Lewis concept of acidity, possibly because they have been schooled thoroughly on Bronsted (protic) acids. The overall performance of 72nd percentile places the group level above that of the national test-taking group yielding the norms.

The topics on the CHEM 4311 course and the number of correct responses are: transition metals, (absorption spectroscopy, bonding theory, kinetics, reactions); average 54% correct responses; organometallic Chemistry (structures, bonding, simple reactions, cluster complexes); average 50% correct responses; basic principles mostly from CHEM 4301 (Inorganic Chemistry I, atomic structure, group theory, ionic bonding, covalent bonding, basic MO theory, electronegativity , IM forces); 46% correct responses; topics not covered (electro-Chemistry, semi-conductors, band gaps, Chemistry of the halogens & noble gases ~ main group compounds); 23% correct responses. Data sheets for CHEM 4311 are not provided here. Students averaged in the 65th percentile despite not having covered the broad spectrum of inorganic topics.

The senior survey (Appendix B) showed that students rated knowledge-related items between good and very good on graduation preparedness. They rated their problem solving ability and independent lab work ability as very good. They rated their self-confidence and assistance with career choice lowest (good+). There were no "poor" ratings from individual respondents.

PSLO2. Knowledge of laboratory techniques and methodology and knowledge of CHEM ical instrumentation such that students are able to use their laboratory expertise to conduct independent laboratory work.

Portfolio; lab reports, research reports, posters, power point
Refer to Appendix C for the CHEM 3213 lab rubric and Appendix D for the assessments filled out by five participating faculty and the summary.

Direct Duck Exam Testing (Appendix A) and Senior Survey (Appendix B)
Please refer to Appendix B.
Appendix A lists the direct results from the Duck exam.

CHEM   3213 Survey
Refer to Appendix E.

Summary of Findings for PSLO2 and associated findings
Portfolio: A start was made this year by developing a rubric for assessing a lab report for an experiment from CHEM   3213. A CHEM 3213 laboratory assessment rubric (Appendix C) was developed by organic chemists of the Department. The rubric for the CHEM 3213 lab reports was normed (tested) by five faculty members examining the laboratory reports submitted for the "Lophine" experiment by each of 10 different students. The filled out rubric forms are submitted as Appendix D, having the student's name removed. This report is taken from those submitted by students towards the end of the semester and involves several aspects of the lab, should be construed to fulfill the overall objectives of the lab. There is no formal lab final for this course.
The conclusion, by comparing the evaluator forms, is that there is reasonably close agreement between department members. Thus, it should be possible in the future to have fewer participants in filling out the rubric forms or perhaps more than one experiment can be assessed, but by fewer faculty assessors for each experiment. That two or perhaps three assessors can be used and have two or three experiments assessed next year. The Lophine lab contains many of the elements that were deemed important for assessment. It is a multi-day lab experiment requiring students to use many of the skills they have learned during the organic lab courses. Students performed adequately on all aspects of their reports and met faculty expectations.

The direct testing analysis results are presented in Appendix A. The DUCK exam results for questions 1-5 relate directly to PSLO2. The most missed questions were #11 relating mass spectral fragmentation to structure; #24 on reduction of an alcohol (Students did not realize how difficult this is.); #47 on the structure of a square planar complex; #49 on estimating acidity; #50-a buffer calculation; #56 on determining % composition from a

chromatographic plot and #57 on calculating enthalpy of combustion. Judging from these items, they seem to represent a smattering across the curriculum rather than a weakness in any particular facet of the curriculum.

The CHEM 4911 senior survey (Appendix B) indicated satisfactory or better perceived knowledge and skills related to the laboratory PSLO2) questions, e.g. Question 1, preparation for grad school or the workplace and Question 2, problem solving ability, Question 3, independent thinking, Question 4, independent lab work and Question 5, self-confidence. While only Question 4 lists the lab per se in the questions, the other questions pertain to both the lab and lecture. The poll shows a satisfaction level of good to very good (2.5/4 overall).

The CHEM 3213 survey results are reported in Appendix E. The results show an increase in student perception of competence in each of the nine questions polled. Question 5 for Spartan (MM=molecular mechanics) was the item rated lowest by the students. The instructor is aware of this rating and is planning to take steps to improve coverage of this computer-related exercise, which occurs outside the laboratory area in a computer lab of the Science Center.

PSLO3. The ability to communicate chemical knowledge effectively based on searching and analyzing the original journal and review literature in one or more of the main Chemistry sub-disciplines.

Portfolio: Power Point Presentation, CHEM 4911/4921.
See Appendix F

Senior Survey
See Appendix B

CHEM   4911 and 4921 Surveys
See Appendix A

Summary of Findings for PSLO3 and Associated Measures

PowerPoint assessments were done in CHEM   4911 and 4921. Results from Appendix F for CHEM 4911 show application for oral presentation rubric for the "long" PP presentation of each student. Some students were evaluated by 2 or 3 "assessors"-the instructor being one of these. The numbers indicate an agreement among multiple assessors within 0.5 pts for each of the categories.

Results from the senior survey (Appendix B) are based on current data. An average response of 75% (very good) was returned on the question (#6) concerning development of communication skills among graduating seniors.

Results (Appendix B) for the CHEM   4911 course (capstone) show a perceived improvement in oral communications skills (question 1) by 33% and 34% for the two CHEM   4911 sections, translating to a change from fair to good/very good. In CHEM

4921, students rated their abilities as excellent in both oral skill level (question 1) and evaluative ability (question 3). Students perceived ability to evaluate talks of theirs and others (question 4) improved by about 20% in the CHEM 4911 sections. Literature assimilation ability changed in CHEM 4911 by over 20% to good and in CHEM 4921 the final student opinion on their ability to evaluate literature was excellent.

Other Indicators of Student Learning

Preparation for General Chemistry - CHEM 1001

Much effort has gone into revising the curriculum and structure of CHEM 1001 as a prep course for CHEM 1401. See Appendix G for recent results. The prep course is looming as becoming bigger and bigger as many entering students are not adequately prepared to take CHEM 1401. Students need help in math and basic Chemistry principles. They need to adjust to the requirement of problem solving ability in CHEM 1401 and more advanced courses.

Alumni Survey (Appendix H)

See Appendix H. The alumni survey shows a positive feeling overall among this group concerning their UCCS educational experiences (4.5/5).

Summary of Assessment Results

CHEM 1411 and CHEM 1511: The 1511 course was formerly entitled General Chemistry II (Honors). Currently it is dubbed General Chemistry II (Majors). Students majoring in Chemistry and Bio-Chemistry are ushered into the 1511 course instead of 1411. The 1511 course is now updated and caters to Chemistry and Bio-Chemistry majors. (Those who decide to switch over after they take 1411 can still proceed on to CHEM 3201.) The 1511 course differs from the 1411 course in some significant ways. (Refer to the syllabus in Appendix H.) Students are introduced to each of the research faculty, for example. The lab (CHEM 1513 meets separately from the non-majors' lab, but has a similar curriculum to that of CHEM 1413.) The purposes of course include familiarization with other Chemistry majors and the emphasis on gaining familiarity with the Department and its faculty, particularly the research faculty. Students are encouraged to consider becoming involved in research soon after completing general Chemistry.

Another area of concern this past year has been the assimilation of General Chemistry II students into Organic Chemistry I (Majors) (CHEM 3201) and the majors' lab (CHEM 3203). The dropout rate for the CHEM 3201 course was 30-40%. Students transferring in from other colleges did poorly and nearly all dropped the course (6/7). The requirement for entering CHEM 3201 is at least a B grade in General Chemistry II. Three students were admitted to the course after having made grades of B- in CHEM 1411. All dropped the CHEM 3201 course. These students accounted for over half of the drop outs. Having a requirement of a B in the first-year courses is definitely on our minds and we have had meetings on this subject. The nearly universal requirement for proceeding in sequential courses in college is a C grade, but we have found that students receiving C's in General Chemistry II do not succeed in CHEM 3201. On top of this is the achievement of students who complete CHEM 3211 and who proceed to upper level Chemistry courses. Since instituting the major's organic courses, the success rate among Chemistry and bio-

Chemistry students in our upper level courses has increased, based on a qualitative analysis. Prior to that, the instructors in our upper level courses complained about the performances of some of their students. On the other hand, the enrollments in our upper level courses have dropped as our number of majors has decreased in the last two years. This is attributable to our application of high standards starting in general Chemistry.

This year, we have formulated and employed rubrics to assess student performance in a few courses as listed and discussed earlier above. We believe that the use of rubrics will enable better assessment of learning in our curriculum.

We modified CHEM 4921 (Bio-Chemistry Capstone / Bio-Chemistry of Human health and development). The course was redesigned to prepare students for an exit from UCCS and a successful entry into graduate school or the work force. Previously, the course was a Bio-Chemistry-content based lecture course in which about 1/2 of the class was instructor led lectures and 1/2 was student presentations on scientific publications (1-2 presentations/student). The course was changed to foci on career development and getting into graduate school, presentation skills, and writing skills. Students presented 5 times in the course (ranging from 2-30 minutes) and wrote both short "popular press" summaries of scientific articles and a 5-page single-spaced research grant. Students in the course took the Bio-Chemistry GRE practice test (scores attached in another email), and did above average as judged against a percentile scale for the practice.

In CHEM 4911/4921, efforts are made to try to prepare students more generally for "life after graduation". These efforts include some proposal writing, oral presentations and a discussion about graduate studies. Results on Question #7 of the Senior survey (Appendix B) suggests that the Department needs to do more work in the area of student career preparation. This will be an item for us to pursue in the upcoming academic year.

Chemistry, MSc
Updated: Fall 2015
Chair: Dave Anderson
Coordinator: Al Schoffstall

Part One: Assurance of Student Learning Plan

Mission Statement
Not yet provided.

Teaching Goals
Not yet provided.

Program Student Learning Outcomes
PSLO1: Knowledge of the theories and concepts in two major areas of Chemistry, one being the student's major area of emphasis (M1, M2, M3, M4, M5, M6, M7, M8).

PSLO2: Apply the fundamentals of research methodology (M1, M2, M3, M4, M5, M6, M8).
PSLO3: Orally communicate CHEM ical knowledge (M1, M2, M3, M4, M5, M6, M8).
PSLO4: Communicate CHEM ical knowledge in writing (M1, M2, M4, M5, M7).
PSLO5: Complete a thesis-driven research project (M1, M2, M4, M5).

Measures
M1. Research Presentation (Thesis and Thesis Defense)
M2. Graduating Student Exit Survey
M3. Semi-Annual Meeting with Student
M4. Project Reports to Advisor
M5. Graduate Alumni survey
M6. IR Exit Survey
M7. Course surveys
M8. Critique of oral research assignments

Part Two: Results of Assessment Activities

PSLO1: knowledge of the theories and concepts in two major areas of Chemistry, one being the student's major area of emphasis.

M1. Research Presentation (Thesis and Thesis Defense)
There were two thesis defenses in this cycle. Both were approved. One was rated as meeting expectations and the second was rated as exceeding expectations (outstanding).

M2. Graduating Student Exit Survey
Both graduates submitted exit surveys. (See Attachment A.) The students rated their education here highly, including the questions on knowledge.

M3. Meetings with the Program Director
Each graduate student meets once per semester to report program progress and to inform the program director of plans for the next semester. The objective is keep students up to date with program requirements and to ensure that they are on the right path towards graduation.

M4. Reports of Students with research advisers
These meetings with advisers are held periodically so that advisers (mentors) keep pace with student progress. Most advisers meet at least weekly with their students. Periodically students are asked to present work, such as in group meetings for example or in poster sessions held during April (Mountain Lion Day) Nearly all active graduate student researchers presented at Mountain Lion Day.

M5. Graduate Alumni survey
Two newer graduates (alumni) who have submitted surveys forms and two graduates from 2-3 past years who have submitted completed forms are listed in the summary of these forms in Attachment B. The ratings are very good to excellent for objectives 2-4 on CHEM ical knowledge.

M6. IR Exit Survey
There is no specific exit survey for Chemistry and bioChemistry graduates.

M7. Course surveys
Course survey data for current graduate students taking current courses are available in summary form Attachment C1. The questions from each survey are also given in Attachment C2. Courses taken by students generally reflect their interest in the sub-area associated with their research as well as one additional area where courses may be selected.

M8. Critique of oral research assignments
Critiques were done in CHEM 5421 (Heterocyclic Chemistry) in spring, 2016. The summary of these critiques is presented in Attachment D.

Summary of Findings for PSLO1 and Associated Measures
The goals of graduate assessment are to track student progress through the program and to keep the students on track towards graduation, normally 1 ½ to 2 years for full-time students. The director checks on student grades and, completed courses and current courses in progress. Each student takes a different schedule of courses depending on the nature of the academic program plan designed with each student. The program director maintains a program plan for each student. The plans include course work in the area of a student's thesis project as well as in another sub-area. BioChemistry students often select a biology course to go along with bioChemistry. Research mentors meet at least weekly, if not daily, with their research students. Progress is noted in terms of degree of effort, progress on carrying out experiments and ongoing results and discussion. Research faculty keep very close tabs on their students and require them to do reports and presentations within their research groups and with other students at UCCS and preferably also nationally at professional conferences. All the while, students are encouraged to be developing thesis plans and gradually designing the framework for their thesis. The program strongly encourages publication of articles in refereed scientific journals. Program assessment encourages regular polling of student opinions about the program and the thesis is the main form of direct assessment. The graduating student survey covers items such as career planning. This is generally up to each faculty member to provide. However, various faculty are often consulted in connection with the next steps a student may take. Some students wish to enter PhD programs and some elect to seek employment once their MSc degree program has been completed. These options are important for students and many discussions with mentors and colleagues helps in the decision-making process.

PSLO2: Apply the fundamentals of research methodology

M1. Research Presentation (Thesis and Thesis Defense)
Research methodology is a key component for any CHEM ical research project. A thorough description of methodology is essential for the thesis and is developed as the student proceeds through the program.

M2. Graduating Student Exit Survey
The exit poll addresses this specifically in questions 1-5. Developing a research protocol is essential for any research project. Students perfect their methodology and this helps them prepare for the workplace or continued research as part of a PhD program. Problem solving is part of developing a methodology and development of independent thought and independent lab work are crucial in development of student thought processes on methodology. This year's students rate each of these items #1-5 as very good-excellent. (Appendix A)

M3. Semi-Annual Meeting of program director with Student
Part of checking on student progress is a determination by the director that research is progressing. If this is not the case, it may be due to faulty methodology development or lack of development as an independent research thinker.

M4. Project Reports to Advisor (Research Mentor)
Meetings with the mentor are key to maintaining a focus on the proper and correct procedures and a proper focus on the direction of the project. These meetings are perhaps the most important aspect of student development and maturation as a researcher.

M5. Graduate Alumni survey
Two new graduates (alumni) who have submitted surveys forms and two graduates from last year who have submitted completed forms. The summary of these forms is presented in Attachment B. The ratings are very good to excellent for all objectives, including developing research methodology. This is a key component in preparing the research student for a professional career.

M8. Critique of oral research assignments
The CHEM 5421 was one critique done in the spring, 2016. Research methodology was not a key factor in the student presentations, as the talks were on CHEM ical knowledge more so than on lab skills and methods.

Summary of Findings for PSLO2 and Associated Measures
Research methodology develops along with a student's project. Each student progresses in thesis are to be able to conquer the goals of the project and to produce results. The results are not always positive and many forays into unworkable approaches may be tried before a good solution is found. That is what students must learn, patience and due diligence.

PSLO3: orally communicate CHEM ical knowledge.

M1. Research Presentation (Thesis Defense)
The evaluation of a thesis defense has been developed into a rubric. (Attachment D) The rubric has been used by two thesis committees. Results from the most recent rubric are in the attachment.

M2. Graduating Student Exit Survey
Two new graduates (alumni) who have submitted surveys forms and two graduates from last year who have submitted completed forms. The summary of these forms is presented in

Attachment B. The ratings are very good to excellent for all objectives, including CHEM ical oral presentation skills. The MSc students have presented several refereed presentations and publications from 2013-2016. A reasonably complete summary is given in Attachment E.

M3. Semi-Annual Meeting with Student
Each graduate student meets once per semester to report program progress and to inform the program director of plans for the next semester. The objective is keep students up to date with program requirements and to ensure that they are on the right path towards graduation.

M4. Project Reports to Advisor
These meetings with advisers are held periodically so that advisers (mentors) keep pace with student progress. Most advisers meet at least weekly with their students. Periodically students are asked to present work, such as in group meetings for example or in poster sessions held during April (Mountain Lion Day) Nearly all active graduate student researchers presented at Mountain Lion Day.

M5. Graduate Alumni survey
Two new graduates (alumni) who have submitted surveys forms and two graduates from last year who have submitted completed forms. The summary of these forms is presented in Attachment B. The ratings are very good to excellent for all objectives, including oral and written skills.

M7. Course surveys
Course survey data for current graduate students taking current courses are available in summary form Attachment C1. The questions from each survey are also given in Attachment C2. Courses taken by students generally reflect their interest in the sub-area associated with their research as well as one additional area where courses may be selected.
M8. Critique of oral research assignments
Critiques were done in CHEM 5421 (Heterocyclic Chemistry) in spring, 2016. The summary of these critiques is presented in Attachment D, along with the forms of two evaluators.

Summary of findings from PSLO2 and Associated Measures
The goals of graduate assessment are to track student progress through the program and to keep the students on track towards graduation, normally 1 ½ to 2 years for full-time students. The director checks on student grades and, completed courses and current courses in progress. Each student takes a different schedule of courses depending on the nature of the academic program plan designed with each student. The program director maintains a program plan for each student. Each new student starting in the fall, 2015 is required to give one seminar on a topic not directly related to his or her research (e.g. different from one's thesis project). This is normally done in conjunction with the capstone course. The two graduates from this year were admitted prior to fall, 2015 and were therefore not required to present. However, they did defend their thesis work. Research faculty keep very close tabs on their students and require them to do reports and oral presentations within their research groups and with other students at UCCS and preferably also nationally at professional conferences. All the while, students are encouraged to

be developing thesis plans and gradually designing the framework for their thesis. The program strongly encourages publication of articles in refereed scientific journals. Program assessment encourages regular polling of student opinions about the program and the thesis is the main form of direct assessment, which includes emphasis on the oral defense component. A rubric for the thesis defense has been used this year. It is attached as Attachment F. Results are also given in the attachment, provided by the eight faculty members who attended the most recent thesis defense in July, 2016

PSLO4: communicate CHEM ical knowledge in writing

M1. Research Presentation (Thesis)
A rubric has been used for this year to evaluate the written thesis. (Attachment F) Norming was accomplished by have all thesis members and an honorary member evaluate the thesis. Results for this latest thesis are also given in Attachment F.

M2. Graduating Student Exit Survey
A summary of exit forms is presented in Attachment B. The ratings are very good to excellent for all objectives, including written communication skills.

M4. Project Reports to Advisor
Meetings with advisers are held periodically so that advisers (mentors) keep pace with student progress. Most advisers meet at least weekly with their students. Periodically students are asked to turn in an accounting of their work and to prepare poster sessions held during April (Mountain Lion Day) Nearly all active graduate student researchers presented at Mountain Lion Day. These reports contribute to the student's written skills.

M5. Graduate Alumni survey
Two new graduates (alumni) who have submitted survey forms and two graduates from last year who have submitted completed forms. The summary of these forms is presented in Attachment B. The ratings are very good to excellent for all objectives, including CHEM ical knowledge.

M7. Course surveys
Course survey data for current graduate students taking current courses are available in summary form Attachment C1. The questions from each survey are also given in Attachment C2

Summary of Findings for PSLO4 and Associated Measures
Written skills are in one sense becoming a lost art in that our educational system is operating on a "need to perform" basis. Those not having to write books and journal articles can often get by without knowing about writing skills, correct rules of grammar and punctuation, but students absolutely need writing skills if they want to proceed as scientists. The system is leaving this more to the research mentors as many students lack basic writing skills and the knowledge of good grammar. MSc. students must know how to read and write in order to be successful in the program and later in their careers. Writing papers and the thesis helps to hone these skills. This is one very important aspect of developing a thesis, the thought process of organization, coverage and actual writing. Also important is proper referencing and citing of previous work enabling the

current project to move forward. It is important for student to learn and understand the progress of scientific thought and achievement. Being able to write is a very key part of student development. All of this must be built into the research process, the meetings with the mentor, the periodic reports, the reading and writing required to keep up with the research area and of course writing the thesis. It is hoped by faculty in our Department that the thesis can form the elements of an acceptable research paper. While an acceptable article may not be required, it is certainly desirable, but not all research leads to publishable data. That should nevertheless be a goal, as it will help our graduates to advance.

PSLO5: Complete a thesis-driven research project.

M1. Research Presentation (Thesis and Thesis Defense)
All graduates must submit and defend a written thesis. Both graduates from this year have done that and graduated or will graduated at the end of the summer. The presentation and thesis are evaluated using rubrics found in Attachment G.

M2. Graduating Student Exit Survey
Two new graduates (alumni) who have submitted surveys forms and two graduates from last year who have submitted completed forms. The summary of these forms is presented in Attachment B. The ratings are very good to excellent for all objectives, including items #1-#5 on the attachment.

M4. Project Reports to Advisor
Most advisers meet at least weekly with their students and are required to submit written documentation of their progress. Periodically students are asked to present work, such as in group meetings for example or in poster sessions held during April (Mountain Lion Day) Nearly all active graduate student researchers presented at Mountain Lion Day. These reports contribute to the student's thesis.

M5. Graduate Alumni survey
Two new graduates (alumni) who have submitted survey forms and two graduates from last year who have submitted completed forms. The summary of these forms is presented in Attachment B. The ratings are very good to excellent for all objectives, including CHEM ical knowledge.

Summary of Findings for PSLO5 and Associated Measures
Research mentors meet at least weekly, if not daily, with their research students. Progress is noted in terms of degree of effort, progress on carrying out experiments and ongoing results and discussion. Research faculty keep very close tabs on their students and require them to do reports and presentations within their research groups and with other students at UCCS and preferably also nationally at professional conferences. All the while, students are encouraged to be developing thesis plans and gradually designing the framework for their thesis. The program strongly encourages publication of articles in refereed scientific journals. Program assessment encourages regular polling of student opinions about the program and the thesis is the main form of direct assessment. It is hoped by faculty in our Department that the thesis can form the elements of a research paper or at least research presentations at national meetings. While an

acceptable article may not be required, it is certainly desirable. At least one national presentation might be something to be discussed in the future. Rubrics for the written thesis and presentation have been developed this year and have been used to evaluate the thesis and presentation of our most recent graduate. (Attachment G)

Other Indicators of Student Learning
PhD School Acceptance Rate: Number of our MSc graduates accepted into PhD programs/Number of our MSc graduates applying to PhD granting schools = Acceptance rate
No students were accepted into PhD programs this year. Both graduates have elected to take jobs in the profession One has an analytical job and the most recent graduate from this summer is interviewing nationally.
Graduation % (3+ years): Number of graduates in last 3.3 years/Number of students in the program for the last 3.3 years' x 100%= Graduation %.
Graduation rate = a/3.3 = b/year
MSc completion % = 7/19 x 100% = 37%
Dropout % = 4/19 x 100% = 21% or about 1 per year
Active student % = 8/19 x 100% = 42%
Graduation rate = 7/3.3 = 2.1 or about 2 graduates per year
Papers and conference papers delivered: Number of papers and presentations/Number of students = Presentation and publication rate
The list of papers and presentations is given in Attachment E.

Summary of Assessment Results
The general procedure for running graduate classes in our program is to have co-listed undergraduate and graduate courses. The reality is that this is the only way we can provide enough diversity of courses to offer an MSc. program. There are challenges with this approach, such as whether to tighten up courses and make them more rigorous as expected for graduation education or can a level of rigor be added without becoming too overbearing on the undergraduates. This has been done by asking the graduate students to teach a class or classes, by requiring extra written and oral work, such as a research report and a presentation to the class or by having assignments above and beyond what is expected of the undergraduates. Another trick is to be able to evaluate the graduate students based upon what they are required to do vs. what is expected of the undergraduates. Our faculty has not met this issue head on and we should be talking about it during the upcoming year to orient ourselves as to what represents best practices in running co-listed undergraduate and graduate courses at the same time in the same room with both undergraduates and graduate students present. This is a feature unique to a number of smaller graduate programs lacking sufficient staff and staff time to be able to deal with graduate and undergraduate courses separately. The question is whether our graduate students are learning in their courses at a level to be expected of graduate students. This is an issue not only in our Department, but for some others at UCCS as well. We are not suggesting that our graduate program is necessarily weak pedagogically. Rather, we are stating simply that we need to look after this issue and try to determine the best ways to achieve high levels of learning for our graduate students.

The MSc. program in Chemistry and bioChemistry is a young program and a small one. With barely enough faculty and research space to drive a successful program, our current enrollment (fall, 2016) eleven students. The number of graduates of the program has been steady over the last few years. Prior to that time, the enrollment was smaller and the number of graduates fewer. A tally of graduates from 2013 to the present is shown below. Therefore, we have seven recent alums and perhaps a half dozen additional graduates from earlier years. We have one Summer, 2016 graduate, not shown on the chart because he has not technically graduated yet. The total for Jan2013-May2016 is seven graduates.

Sp 2013	Sum 2013	Fall 2013	Sp 2014	Sum 2014	Fall 2014	Sp 2015	Sum 2015	Fall 2015	Sp 2016
0	0	0	1	1	1	1	2	1	0

If we sum up our graduate enrollment over the past three years, Jan2013-Aug2016, we have had 19 different thesis students, seven of whom have graduated, giving a graduation rate of 2 per year.

Geography and Environmental Studies, BA
Updated: Fall 2015
Chair: Curtis Holder
Coordinator: John Harner

Part One: Assurance of Student Learning Plan

Program Student Learning Outcomes
> PSLO1: Understanding Configuration/Processes of Landforms: Demonstrate an understanding of processes shaping Earth's landforms and environments. (M1, M2, M3).

> PSLO2: Knowledge of Variety/Process of Human Geography: Recognize how the actions and behaviors of diverse cultures impact the natural environment and affect sustainability (M1, M2, M3)

> PSLO3: Knowledge of Variety/Process of Human Geography: Recognize how the actions and behaviors of diverse cultures impact the natural environment and affect sustainability (M1, M2, M3)

Measures
> M1. Exit Exam
> M2. Exit Survey
> M3. Summit (Capstone) rubric

Part Two: Results of Assessment Activities

PSLO1 - Understanding Configuration/Processes of Landforms: Demonstrate an understanding of processes shaping Earth's landforms and environments

Exit Exam
n = 202. Achievement target = 71% correct for the 15 questions on this SLO
Minimum acceptable threshold = 60%

Average score: 70.5% correct

Domain	Poor Competency (<51%)	Marginal Competence (51-60%)	Average Competence (61-70%)	Above Average Competence (71-80%)	Advanced Competence (>80%)
2014-2016	12%	8%	23%	31%	24%

Interpretation: met target (with rounding error), but still 20% are below acceptable threshold

Exit Survey
On a Likert scale of 1 to 5, achievement target for both of the following questions we expect a mean score of 3.5 or better (n=197).

"How do you feel the department has prepared you for understanding the processes that shape the natural landscape?" (mean score = 4.0)

Domain	1 I am not at all proficient	2 I am less than proficient	3 I am somewhat proficient	4 I am proficient	5 I have developed advanced proficiency
2014-2016	0%	1.0%	19.7%	56.6%	22.2%

"I attained proficiency in my understanding of the physical processes that shape the earth," (mean score = 4.25)

Domain	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
2014-2016	0%	1.0%	9.6%	52.5%	36.4%

Interpretation: overall student satisfaction with the curriculum and instruction

Summit (Capstone) rubric
Demonstrate an understanding of processes shaping Earth's landforms and environments:
n = 8. Achievement target = 70% of total possible points
Minimum acceptable threshold = 60% of total possible points

Average score: 76.2% of total possible points

Domain	3 Above Average	2 Average	1 Below Average
2014-2016	35.7%	57.1%	7.1%

Interpretation: small sample size, but encouraging numbers.

Summary of Findings for PSLO1 and Associated Measures

We met all assessment objectives for physical geography. We are a little low with content knowledge (Exit Exam) and need to reduce the number below our acceptable threshold

PSLO2 - Knowledge of Variety/Process of Human Geography: Recognize how the actions and behaviors of diverse cultures impact the natural environment and affect sustainability

Exit Exam, n = 202. Achievement target = 71% correct for the 23 questions on this SLO
Minimum acceptable threshold = 60%

Average score: 73.8% correct

Domain	Poor Competency (<51%)	Marginal Competence (51-60%)	Average Competence (61-70%)	Above Average Competence (71-80%)	Advanced Competence (>80%)
2014-2016	4%	7%	30%	23%	36%

Interpretation: met target, 11% below acceptable threshold

Exit Survey, On a Likert scale of 1 to 5, achievement target for both of the following questions we expect a mean score of 3.5 or better (n=198).

"How do you feel the department has prepared you for understanding the spatial processes that shape human society and landscape?" (mean score = 3.93)

Domain	1 I am not at all proficient	2 I am less than proficient	3 I am somewhat proficient	4 I am proficient	5 I have developed advanced

					proficiency
2014-2016	0%	2.5%	21.2%	56.6%	19.7%

"I attained proficiency in my knowledge of the human processes that shape the earth," (mean score = 4.22)

Domain	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
2014-2016	0%	1.1%	9.1%	56.1%	32.8%

Interpretation: overall satisfaction from students with curriculum and instruction

Summit (Capstone) Rubric
Recognize how actions and behaviors of diverse cultures impact the natural environment and affect sustainability
n = 8. Achievement target = 70% of total possible points
Minimum acceptable threshold = 60% of total possible points

Average score: 78.1% of total possible points

Domain	3 Above Average	2 Average	1 Below Average
2014-2016	44.7%	47.4%	7.9%

Interpretation: small sample size but encouraging numbers.

Summary of Findings for PSLO2 and Associated Measures

We met assessment targets for human geography and sustainability. Still too many people scoring below average or not feeling competent

PSLO3 - Understanding Methods of Analysis: Demonstrate an understanding of the methods of analysis used to solve geographic problems and communicate effectively.

Exit Exam, n = 202. Achievement target = 71% correct for the 15 questions on this SLO
Minimum acceptable threshold = 60%

Average score: 72.8% correct

Domain	Poor Competency (<51%)	Marginal Competence (51-60%)	Average Competence (61-70%)	Above Average Competence (71-80%)	Advanced Competence (>80%)

2014-2016	12%	6%	21%	28%	33%

Interpretation: Great improvement in this category from last assessment. Met target, but 18% below acceptable threshold

Exit Survey
On a Likert scale of 1 to 5, achievement target for both of the following questions we expect a mean score of 3.5 or better (n=198).

"How has the department prepared you for understanding geospatial tools and methods of analysis used to solve geographic problems?", (mean score = 3.74)

Domain	1 I am not at all proficient	2 I am less than proficient	3 I am somewhat proficient	4 I am proficient	5 I have developed advanced proficiency
2014-2016	0%	8.1%	29.8%	39.9%	20.7%

"I attained proficiency in using and understanding geospatial technologies" (mean score = 3.93)

Domain	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
2014-2016	0.5%	6.1%	20.2%	46.0%	26.8%

Interpretation: overall satisfaction with curriculum and instructions, but higher numbers who feel not proficient

Summit (Capstone) Rubric
Demonstrate an understanding of the methods of analysis used to solve geographic problems and communicate effectively
n = 8. Achievement target = 70% of total possible points
Minimum acceptable threshold = 60% of total possible points

Average score: 76.0% of total possible points

Domain	3 Above Average	2 Average	1 Below Average
2014-2016	40.0%	48.0%	12.0%

Interpretation: small sample size but encouraging numbers

Summary of Findings for PSLO3 and Associated Measures
We met assessment targets for geospatial methods. Still too many who aren't proficient or who are below average

Other Indicators of Student Learning

I feel adequately prepared for work in fields in my major: 78.3% agree or strongly agree

I am proficient in my knowledge of most environmental problems: 86.8% agree or strongly agree

I have a good understanding of sustainability: 88.3% agree or strongly agree

GES courses enhanced my ability to think critically and analytically: 89.4% agree or strongly agree

I am happy with the quality of the GES program: 87.8% agree or strongly agree

Overall Summary of Assessment Results

This is the first year we have taught our Geography Summit (capstone) course and used our new assessment rubric. The sample size is small, since most students are grandfathered out of that requirement until upcoming years. We will see how results change in the future.

In general, the lowest scores were for our geospatial methods, which includes; GIS and other geospatial classes, as well as general communication and graphical skills. We have had much turnover in GIS faculty lately, but continue to strengthen the rigor of our geospatial program. We expect these numbers to improve.

Geography and Environmental Studies, MA
Updated: Fall 2015
Chair: Curtis Holder
Coordinator: John Harner

Part One: Assurance of Student Learning Plan

Program Student Learning Outcomes

PSLO1: Demonstrate the ability to conceptualize a research topic and refine that broad interest into a focused research question that students can complete (M1, M2).
PSLO2: Demonstrate the ability to apply analytical methods that enable the student to answer their research question (M1, M2).
PSLO3: Successfully complete an independent, original research thesis (M2, M3, M4).
PSLO4: Successfully communicate research findings to the public (M2, M3, M4).

Measures
    M1. Proposal Defense
    M2. MA Exit Survey
    M3. Thesis Defense – oral
    M4. Thesis Defense – written (refer to M3 for measure rubric)

Part Two: Results of Assessment Activities

PSLO1. Demonstrate the ability to conceptualize a research topic and refine that broad interest into a focused research question that students can complete.

Proposal Defense
All MA students must first defend their research proposal prior to initiating field work. Three MA committee members use a Proposal Defense evaluation rubric that addresses SLO 1. The criteria for evaluating the thesis proposal are 1) Adequate review of the literature, 2) Level of research question focus, from broad to precise. Our target is an overall mean of 2.25 on these questions. Minimum acceptable mean score = 2.0. For this period, n=13   Mean score: 2.27.

Domain	1 Weak	2 Adequate	3 Strong
2014-2016	11.5%	50.0%	38.5%

Interpretation: Meeting expectations. Would like less than 11.5%, in the weak category, however.

MA Exit Survey
Using our Exit Survey as an indirect measure, Question 1 asks "Your ability to conceptualize a research topic and refine that broad interest into a focused research question" On a Likert scale from 1 to 5 (1 = not at all proficient, 2 = less than proficient, 3 = somewhat proficient, 4 = proficient, 5 = I have developed advanced proficiency), our target is a score of 3.5. Minimum acceptable score = 3.0.

This period n= 7, average score = 4.43.

Domain	1 I am not at all proficient	2 I am less than proficient	3 I am somewhat proficient	4 I am proficient	5 I have developed advanced proficiency
2012-2013	0%	0%	0%	57%	43%

Two other questions (15 and 16) ask about knowledge to evaluate research sources for their quality and objectivity and for their relevance to their research topic. On a scale from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) our target is an average score of 3.5. Minimum acceptable score = 3.0.

For this period, n = 7, average score = 4.86.

Domain	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
2012-2013	0%	0%	0%	14.3%	85.7%

Interpretation: strong results

Summary of PSLO1 and Associated Measures
Students perceive that they can conceptualize a tight research question, but faculty assessment still point out some weakness

PSLO2. Demonstrate the ability to apply analytical methods that enable the student to answer their research question.

Proposal Defense
All MA students must first defend their research proposal prior to initiating field work. Three MA committee members use a Proposal Defense evaluation rubric that addresses SLO 2. The criteria for evaluating the thesis proposal are 1) Appropriate analytical methods to answer the question, 2) Competency of student's skill set to complete the project, and 3) The degree to which the proposed project is "do-able" in the 5-year MA limit. Our target is an overall mean of 2.25 on these questions. Minimum acceptable mean score is 2.0. For this period, n= 13.   Mean score: 2.54.

Domain	1 Weak	2 Adequate	3 Strong
2014-2016	7.7%	30.8%	61.5%

Interpretation: Meeting expectations. Good results.

MA Exit Survey
Using our Exit Survey as an indirect measure, Question 2 asks "your ability to apply analytical methods that enable you to answer a research question." On a Likert scale from 1 to 5 (1 = not at all proficient, 2 = less than proficient, 3 = somewhat proficient, 4 = proficient, 5 = I have developed advanced proficiency), our target is a score of 3.5. Minimum acceptable score = 3.0.

For this period, n = 7, average score =4.14.

Domain	1 I am not at all proficient	2 I am less than proficient	3 I am somewhat proficient	4 I am proficient	5 I have developed advanced proficiency
2012-2013	0%	0%	0%	85.7%	14.3%

Three other questions ask about proficiency to evaluate diverse social and physical information and ability to conceptualize spatial relationships (7, 8, and 14). On a scale from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) our target is an average score of 3.5. Minimum acceptable score = 3.0.

For this period, n = 7, average score = 4.33.

Domain	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
2012-2013	0%	0%	0%	66.7%	33.3%

Interpretation: strong results

Summary of Findings for PSLO2 and Associated Measures
In general MA students are proficient or better at applying necessary analytical methods

PSLO3. Successfully complete an independent, original research thesis.

Thesis Defense – oral
All MA students defend their research thesis upon completion. Three MA committee members use a Thesis Defense evaluation rubric that addresses SLO 3. The criteria for evaluating the thesis proposal are 1) Appropriate review of the literature, 2) presentation of findings from research, 3) competent application of appropriate research techniques, 4) objective and accurate interpretation of the findings of the research, and 5) awareness of what new questions may be raised by the findings. Our target is an overall mean of 2.25 on these questions. Minimum acceptable mean score is 2.0. For this period, n= 11. Mean score: 2.56.

Domain	1 Weak	2 Adequate	3 Strong
2014-2016	5.4%	32.7%	61.8%

Interpretation: Meeting expectations.   Good results.

MA Exit Survey

Using our Exit Survey as an indirect measure, Question 3 asks "Your ability to successfully complete an independent, original research thesis. " On a Likert scale from 1 to 5 (1 = not at all proficient, 2 = less than proficient, 3 = somewhat proficient, 4 = proficient, 5 = I have developed advanced proficiency), our target is a score of 3.5. Minimum acceptable score = 3.0.

For this period, n = 7, average score = 4.43

Domain	1 I am not at all proficient	2 I am less than proficient	3 I am somewhat proficient	4 I am proficient	5 I have developed advanced proficiency
2012-2013	0%	0%	0%	57.1%	42.9%

We also ask Question 13, "My GES courses enhanced my ability to think critically and analytically. On a scale from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) our target is an average score of 3.5. Minimum acceptable score = 3.0.

For this period, n = 7, average score = 4.43

Domain	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
2012-2013	0%	0%	0%	57.1%	42.9%

Interpretation: Strong results

Overall Summary of PSLO 3 and Associated Measures
We are very pleased at the success rate for MA students to complete their thesis

PSLO4. Successfully communicate research findings to the public.

Thesis Defense – oral
All MA students defend their research thesis upon completion. Three MA committee members use a Thesis Defense evaluation rubric that addresses SLO 4. The criteria for evaluating the thesis proposal is 1) Clear, correct, and well-organized writing and presentation. Our target is an overall mean of 2.25 on these questions. Minimum acceptable mean score is 2.0. For this period, n= 11.   Mean score: 2.82.

Domain	1 Weak	2 Adequate	3 Strong
2014-2016	0%	18.1%	81.8%

Interpretation: Meeting expectations. Good results

MA Exit Survey
Using our Exit Survey as an indirect measure, Question 4 asks "Your ability to successfully communicate research findings to the public." On a Likert scale from 1 to 5 (1 = not at all proficient, 2 = less than proficient, 3 = somewhat proficient, 4 = proficient, 5 = I have developed advanced proficiency), our target is a score of 3.5. Minimum acceptable score = 3.0.

For this period, n = 7, average score = 4.43

Domain	1 I am not at all proficient	2 I am less than proficient	3 I am somewhat proficient	4 I am proficient	5 I have developed advanced proficiency
2012-2013	0%	0%	0%	57.1%	42.9%

We also ask Questions 9 and 12 about communication skills to present solutions or recommendations clearly and improvement of writing skills. On a scale from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) our target is an average score of 3.5. Minimum acceptable score = 3.0.

For this period, n = 7, average score = 4.38.

Domain	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
2012-2013	0%	0%	0%	62.5%	37.5%

Interpretation: Strong results

Summary of Findings for PSLO4 and Associated Measures
MA students have been great at effectively communicating their thesis results

Other Indicators of Student Learning
We also have general questions in our MA Exit Survey about the performance of our department that do not directly measure SLOs. For example, on a scale of 1 to 5 (1=

strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree), students mean scores were: Question 5: I am adequately prepared to work in fields related to my research emphasis: 4.29; Question 6: I attained proficiency in my understanding of and appreciation for the interactions between the human and the natural world: 4.57; Question 11: I have a good understanding of the concept of sustainability: 4.14, and Question 20: I am happy with the quality of the GES program: 4.57

Summary of Assessment Results

While not a revision to our courses or curriculum, we intend to change the assessment method for the MA proposal defense and thesis defense. Currently committee members collaborate to agree upon the scores for the evaluation rubrics. They therefore submit one rubric for each student's proposal defense and for their thesis defense. We will now let each committee member fill out their evaluation rubric individually and the assessment coordinator will compile the scores. This will result in more data, and a better judgmental assessment from each faculty member.

Geography and Environmental Studies, Sustainable Development, minor

Updated: Fall 2015
Chair: Curtis Holder
Coordinator: David Havlick

Part One: Assurance of Student Learning Plan

Program Student Learning Outcomes

PSLO1: Describe the interdependency of sustainable development's three pillars of social equity, environment, and economy (M1, M2, M3, M4, and M5).

PSLO2: Provide existing examples of environmental degradation, economic failure, and social inequity that motivates these interrelated concerns (M1, M2, M3, M4, and M5).

PSLO3: Provide plausible explanations for the cause of these problems, their interdependency, and reasonable ideas for their resolution (M1, M2, M3, M4, and M5).

PSLO4: Critically understand the current state of knowledge regarding climate change, accurately depict where uncertainty exists with respect to climate change, and identify examples of social (i.e. social equity), economic, and environmental impacts resulting from climate change, such as disruptions to water supplies, water shortages, climate justice, food systems, etc. (M1, M2, M3, M4, and M5).

Measures

M1. Capstone Presentation
M2. Exit Exam
M3. Capstone Project: self-evaluation
M4. Capstone Project: peer evaluation (Refer to M3)
M5. Reflective Paper

Part Two: Results of Assessment Activities

PSLO1: Describe the interdependency of sustainable development's three pillars of social equity, environment, and economy.

Capstone Presentation
All students in the SUDV minor are required to take GES 4800, the capstone course in the minor. The course culminates in student working groups delivering a public presentation to report on group research projects they have completed. This presentation is graded as a course requirement, but also evaluated in terms of a 1-4 point (low to high) rubric developed for the minor.

Two criteria from this rubric relate to PSLO1: 1) understanding the pillars of sustainability; and 2) awareness of interdependence of pillars of sustainability. Our target is an overall mean of 3.0 for these measures. For this period, n=20. Mean score: 3.25.

Domain	4 Exceeds expectations	3 Meets expectations	2 Minimally competent	1 Not competent
2015-2016	47.5%	30%	22.5%	0%

Exit Exam
21 students in the spring 2016 GES 4800 course took the exit exam. There are two questions on this exam that relate to PSLO1. Our target is an overall mean of 90% for these questions. Minimum acceptable score = 70%. Student scores averaged 88.1%.

88.1% indicates the percent of correct responses for the two questions related to this PSLO.

Capstone Project: self-evaluation
The GES 4800 capstone course self-evaluation is a useful tool for evaluating how well students perceive their work and contribution to the capstone project. Students were not asked specifically in this assignment to relate their comments to the broader concepts central to the course objectives, however, and it did not provide relevant data for this PSLO.

Capstone Project: peer evaluation
The GES 4800 capstone course peer-evaluation is a useful tool for evaluating how well students perceive the contributions of classmates in their working groups to the capstone project. Students were not asked specifically in this assignment to relate their comments to the broader concepts central to the course objectives, however, and it did not provide relevant data for this PSLO.

Reflective Paper
All students in the SUDV minor are required to take GES 4800, the capstone course in the minor. One of the course requirements is to write a paper that reflects upon and

synthesizes student learning in the course. The assignment is intentionally open-ended in order to access informational as well as affective domains; as a result, not every student addresses ideas relating to every PSLO. The reflective papers were graded as a course requirement, but also evaluated in terms of a 1-4 point (low to high) rubric developed for the minor.

Our target is an overall mean of 3.0 for these measures. For PSLO1, n=13. Mean score: 2.92.

Domain	4 Exceeds expectations	3 Meets expectations	2 Minimally competent	1 Not competent
2015-2016	23%	46%	31%	0%

Summary of Findings for PSLO1 and Associated Measures

Graduates in the minor are proficient and meeting or very nearly meeting program expectations.

PSLO2: Provide existing examples of environmental degradation, economic failure, and social inequity that motivates these interrelated concerns.

Capstone Presentation
All students in the SUDV minor are required to take GES 4800, the capstone course in the minor. The course culminates in student working groups delivering a public presentation to report on group research projects they have completed. This presentation is graded as a course requirement, but also evaluated in terms of a 1-4 point (low to high) rubric developed for the minor.

There is one criterion from this rubric that relates to PSLO2: knowledge of human/environment interaction. Our target is an overall mean of 3.0 for these measures. For this period, n=20. Mean score: 3.2.

Domain	4 Exceeds expectations	3 Meets expectations	2 Minimally competent	1 Not competent
2015-2016	40%	40%	20%	0%

Exit Exam
21 students in the spring 2016 GES 4800 course took the exit exam. There are eleven questions on this exam that relate to PSLO2. Our target is an overall mean of 90% for these questions. Minimum acceptable score = 70%. Student scores averaged 68.4%.

68.4% indicates the percent of correct responses for the eleven questions related to this PSLO.

Capstone Project: self-evaluation
The GES 4800 capstone course self-evaluation is a useful tool for evaluating how well students perceive their work and contribution to the capstone project. Students were not asked specifically in this assignment to relate their comments to the broader concepts central to the course objectives, however, and it did not provide relevant data for this PSLO.

Capstone Project: peer evaluation
The GES 4800 capstone course peer-evaluation is a useful tool for evaluating how well students perceive the contributions of classmates in their working groups to the capstone project. Students were not asked specifically in this assignment to relate their comments to the broader concepts central to the course objectives, however, and it did not provide relevant data for this PSLO.

Reflective Paper
All students in the SUDV minor are required to take GES 4800, the capstone course in the minor. One of the course requirements is to write a paper that reflects upon and synthesizes student learning in the course. The assignment is intentionally open-ended in order to access informational as well as affective domains; as a result, not every student addresses ideas relating to every PSLO. The reflective papers were graded as a course requirement, but also evaluated in terms of a 1-4 point (low to high) rubric developed for the minor.

Our target is an overall mean of 3.0 for these measures. For PSLO2, n=20. Mean score: 2.65.

Domain	4 Exceeds expectations	3 Meets expectations	2 Minimally competent	1 Not competent
2015-2016	5%	65%	20%	10%

Summary of Findings for PSLO2 and Associated Measures
Graduates in the minor are minimally or near-minimally proficient. This is an area in the minor that calls for improvement.

PSLO3: Provide plausible explanations for the cause of these problems, their interdependency, and reasonable ideas for their resolution

Capstone Presentation
All students in the SUDV minor are required to take GES 4800, the capstone course in the minor. The course culminates in student working groups delivering a public presentation to report on group research projects they have completed. This presentation is graded as a course requirement, but also evaluated in terms of a 1-4 point (low to high) rubric developed for the minor.

There are two criteria from this rubric that relate to PSLO3: 1) knowledge of sustainability-related policies, and 2) use and application of sustainability-related evidence. Our target is an overall mean of 3.0 for these measures. For this period, n=20. Mean score: 2.98.

Domain	4 Exceeds expectations	3 Meets expectations	2 Minimally competent	1 Not competent
2015-2016	27.5%	42.5%	30%	0%

Exit Exam
21 students in the spring 2016 GES 4800 course took the exit exam. There are eight questions on this exam that relate to PSLO3. Our target is an overall mean of 90% for these questions. Minimum acceptable score = 70%. Student scores averaged 76.2%.

76.2% indicates the percent of correct responses for the eight questions related to this PSLO.

Capstone Project: self-evaluation
The GES 4800 capstone course self-evaluation is a useful tool for evaluating how well students perceive their work and contribution to the capstone project. Students were not asked specifically in this assignment to relate their comments to the broader concepts central to the course objectives, however, and it did not provide relevant data for this PSLO.

Capstone Project: peer evaluation
The GES 4800 capstone course peer-evaluation is a useful tool for evaluating how well students perceive the contributions of classmates in their working groups to the capstone project. Students were not asked specifically in this assignment to relate their comments to the broader concepts central to the course objectives, however, and it did not provide relevant data for this PSLO.

Reflective Paper
All students in the SUDV minor are required to take GES 4800, the capstone course in the minor. One of the course requirements is to write a paper that reflects upon and synthesizes student learning in the course. The assignment is intentionally open-ended in order to access informational as well as affective domains; as a result, not every student addresses ideas relating to every PSLO. The reflective papers were graded as a course requirement, but also evaluated in terms of a 1-4 point (low to high) rubric developed for the minor.

Our target is an overall mean of 3.0 for these measures. For PSLO3, n=20. Mean score: 3.1.

Domain	4 Exceeds	3 Meets	2 Minimally	1 Not

	expectations	expectations	competent	competent
2015-2016	30%	55%	10%	5%

Summary of Findings for PSLO3 and Associated Measures

> Graduates in the minor are minimally proficient, but not meeting full expectations. More attention to this area will be useful.

PSLO4: Critically understand the current state of knowledge regarding climate change, accurately depict where uncertainty exists with respect to climate change, and identify examples of social (i.e. social equity), economic, and environmental impacts resulting from climate change, such as disruptions to water supplies, water shortages, climate justice, food systems, etc.

> Exit Exam
> 21 students in the spring 2016 GES 4800 course took the exit exam. There are four questions on this exam that relate to PSLO4. Our target is an overall mean of 90% for these questions. Minimum acceptable score = 70%. Student scores averaged 71.4%.
>
> 71.4% indicates the percent of correct responses for the four questions related to this PSLO.
>
> Capstone Project: peer evaluation
> The GES 4800 capstone course self-evaluation is a useful tool for evaluating how well students perceive their work and contribution to the capstone project. Students were not asked specifically in this assignment to relate their comments to the broader concepts central to the course objectives, however, and it did not provide relevant data for this PSLO.
>
> Capstone Project: self-evaluation
> The GES 4800 capstone course peer-evaluation is a useful tool for evaluating how well students perceive the contributions of classmates in their working groups to the capstone project. Students were not asked specifically in this assignment to relate their comments to the broader concepts central to the course objectives, however, and it did not provide relevant data for this PSLO.
>
> Reflective Paper
> All students in the SUDV minor are required to take GES 4800, the capstone course in the minor. One of the course requirements is to write a paper that reflects upon and synthesizes student learning in the course. The assignment is intentionally open-ended in order to access informational as well as affective domains; as a result, not every student addresses ideas relating to every PSLO. The reflective papers were graded as a course requirement, but also evaluated in terms of a 1-4 point (low to high) rubric developed for the minor.

Our target is an overall mean of 3.0 for these measures. For PSLO4, n=10. Mean score: 2.7.

Domain	4 Exceeds expectations	3 Meets expectations	2 Minimally competent	1 Not competent
2015-2016	10%	50%	40%	0%

Summary of Findings for PSLO4 and Associated Measures

Graduates in the minor are minimally proficient or nearly so, but not meeting full expectations. More attention to this area will be useful.

Other Indicators of Student Learning

Peer- and self-evaluation

Though these assignments did not report back relevant information specific to the rubric and PSLOs identified for this assessment, in a number of these evaluations students did indicate that they felt better prepared for careers in sustainability-related fields – and for living more sustainable lives – than they had prior to taking the GES 4800 course and completing the requirements for the minor.

Though this isn't listed as a measurable outcome of the minor, it clearly seems important and worth highlighting as a success of the program.

Overall Summary of Assessment Results

We continue to evaluate and revise the SUDV minor in an effort to improve its coherence and utility to students. From 2014-2016 we have been undertaking a significant review of the structure and requirements of the minor, and in fall 2016 will be presenting these to the LAS C&R Committee for consideration. We have also created a new GES 1500: Introduction to Environmental Studies and Sustainability course that should provide an important entry point for the minor that builds a better foundation of broad knowledge and interest for students pursuing the minor.

In 2015-2016 we also created a new rubric, with guidance from Lynne Calhoun, to use in the SUDV minor assessment.

In 2016-2017, we will be revising the exit exam used for the GES 4800 capstone course. The current exam is too limited in scope and a bit dated. We will also reconsider the utility of the peer- and self-evaluations as metrics for this assessment, as neither delivered information that was relevant to this report.

Applied Mathematics, MSc
Updated: Fall 2015
Chair: Bob Carlson
Coordinator: Sarbarish Chakravarty

Part One: Assurance of Student Learning Plan

Program Student Learning Outcomes

PSLO1: Mathematical Communication - Students will be able to communicate complex mathematical content to a broad audience including undergraduate students, graduate students, faculty, and motivated lay persons. Students will be able to explain mathematical models, generate and interpret data, and draw valid conclusions, and will be able to organize a coherent mathematical argument in a presentation setting (M1, M2, M3).

PSLO2: Sophisticated Logical Thinking- Students will demonstrate the ability to think critically and use analytical reasoning to prove mathematical statements (M1, M2, M4).

PSLO3: Advanced Problem Solving - Students will be able to formulate creative and original ideas and solutions to mathematical problems (M1, M2, M4).

PSLO4: Advanced Computational Methods - Students will master advanced mathematical techniques and algorithms, demonstrate the ability to develop appropriate models, find solution methods, and interpret their results. Students will develop skills in performing sophisticated mathematical computations (M2, M3, M4).

PSLO5: Applications - Students will understand the practical application of mathematical models, algorithms, and concepts (M3, M4).

Measures

M1. MATH 5320, MATH 4310
M2. MATH 5130
M3. Oral Presentation
M4. Exit Survey

Part Two: Results of Assessment Activities

PSLO1: Mathematical Communication - Students will be able to communicate complex mathematical content to a broad audience including undergraduate students, graduate students, faculty, and motivated lay persons. Students will be able to explain mathematical models, generate and interpret data, and draw valid conclusions, and will be able to organize a coherent mathematical argument in a presentation setting.

MATH 5320, MATH 4310

After completing these courses, 80% of students were proficient (score of 60% or above) in the Analysis Comprehensive Exams during Jan 2015-Jan 2016. Proficiency in these exams demonstrates that students are able to process complex mathematical arguments and communicate them clearly.

MATH 5130

Course was offered in Fall 2016. 67% of students were competent (score > 60%) in the pre-test while 89% showed competency (score > 60%) in the post-test. The target of at least 20% increase in the competency level was met. The pre & post tests evaluated student ability to present coherent mathematical arguments in solving problems.

Oral Presentation

Students presented their research work on an advanced mathematical topic. 75% of the students were rated highly proficient (score > 80%) in communicating mathematical contents to a broad audience, while 25% were rated as proficient (60% < score < 80%)

Exit Survey

36% of students polled in the annual survey believed that they were competent in communicating complex mathematical ideas effectively, while 64% thought they were highly competent.

Summary of Findings for PSLO1 and Associated Measures

The student performances in the Associated Measures are strong indications that the teaching goals (TG1-- 4) in the MS program are on track to prepare students in their ability to process and communicate complex mathematical ideas.

PSLO2: Sophisticated Logical Thinking- Students will demonstrate the ability to think critically and use analytical reasoning to prove mathematical statements.

MATH 5320, MATH 4310

After completing these courses, 20% of the students were highly proficient (score > 80%) and 60% were proficient (60% < score < 80%) in the Analysis Comprehensive Exams during Jan 2015-Jan 2016. These exams underscore mathematical reasoning and proofs of mathematical statements.

MATH 5130

In Fall 2016, 67% of students were competent (score > 60%) in the pre-test while 89% showed competency (score > 60%) in the post-test. The pre- and post- exams test student's ability to grasp abstract mathematical concepts.

Exit Survey

50% of students believed they were competent in analytical thinking and use of logical reasoning, the remaining felt they were highly competent.

Summary of Findings for PSLO2 and Associated Measures

The student performances in the Associated Measures indicate that the teaching goal (TG1) in the MS program is the proper avenue to develop analytical reasoning and critical thinking skills among the graduate students

PSLO3: Advanced Problem Solving - Students will be able to formulate creative and original ideas and solutions to mathematical problems.

MATH 5320, MATH 4310

20% of the students were highly proficient (score > 80%) and 60% were proficient (60% < score < 80%) in the Analysis Comprehensive Exams in AY 2015-16. The difficulty level of these exams suggest that the student performance is satisfactory in solving Analysis problems.

MATH 5130

In Fall 2016, 67% of students were competent (score > 60%) in the pre-test while 89% showed competency (score > 60%) in the post-test. The pre- and post- exams test scores demonstrate marked improvement in problem solving skills at an advanced level.

Exit Survey

One out of 14 students (7%) felt that his/her ability to solve advanced problems is proficient, while the remaining students believed they have achieved a high proficiency level in this area.

Summary: Student performances in the Associated Measures indicate that the teaching goals (TG1 – 4) are on track in preparing students develop advanced problem solving skills.

PSLO4: Advanced Computational Methods - Students will master advanced mathematical techniques and algorithms, demonstrate the ability to develop appropriate models, find solution methods, and interpret their results. Students will develop skills in performing sophisticated mathematical computations

MATH 5130

The pre- and post-test results (see PSLO1-3) indicate that a majority of students were able to learn advanced mathematical techniques and perform sophisticated mathematical computations.

Oral Presentation

75% of the students were rated highly proficient (score > 80%) in their understanding of advanced mathematical concepts, while 25% were rated as proficient (60% < score < 80%).

Exit Survey
21% of students believed they were competent in advanced computational methods, while 79% students felt they were highly competent. Moreover, 28.5% of the polled students believed they were outstanding in this area.

Summary of Findings for PSLO4 and Associated Measures

Student performances in the Associated Measures indicate that the teaching goals are on target to train students with advanced computational techniques. Additionally, the department has recently implemented a computing competency policy that requires every student in the MS program to complete a course in mathematical computing.

PSLO5: Applications - Students will understand the practical application of mathematical models, algorithms, and concepts.

Oral Presentation
75% of the students demonstrated high proficiency (score $> 80\%$) in their ability to understand practical applications of mathematical models, while 25% were rated as proficient ($60\% <$ score $< 80\%$).

Exit Survey
36% of students believed they are proficient in their understanding of the practical applications of mathematical models and in their ability to apply their mathematical knowledge to solve new practical problems. The rest (64%) believed they are highly proficient, and 21% of all students thought of themselves as outstanding in this area.

Summary for findings for PSLO5 and Associated Measures

The student achievements in the PSLO5 measures indicate that the various computing, Math modeling and optimization courses offered in the MS in Applied Math program are instrumental in developing students' knowledge and understanding of practical application of mathematical models and concepts.

Other Indicators of Student Learning

Computational Competency Requirement
All students in the program are required to complete one of the following computationally intensive courses: Math 5480, Math 5650, Math 5670, or Math 3670/5900. This requirement is intended to enhance students' computational skills and make then more competitive in securing jobs in industry or in pursuing a PhD in areas including physical applied mathematics and scientific computation.

Mathematics, BA
Updated: Fall 2015
Chair: R Carlson
Coordinator: Z. Mesyan

Part One: Assurance of Student Learning Plan

Mission Statement
The mission of the UCCS Mathematics Department is to offer undergraduate degrees in mathematics that prepare students for mathematical work in industry, to teach in secondary schools or community colleges, or to pursue graduate studies. We teach our students to use mathematical models, computational techniques and modern technology to solve practical problems, and to communicate mathematical ideas effectively. The Mathematics Department also has a crucial service role, helping students in fields such as engineering, science and business to effectively use mathematics and quantitative analysis. The Mathematics Department strives to teach well, maintain high standards for student performance, and keep its curriculum up to date. The Department also takes pride in a faculty that is active in scholarship and research, which includes the encouragement and supervision of undergraduate research projects, student participation in local and regional conferences, and national student competitions.

Teaching Goals
TG 1: Problem-Solving Skills - To effectively transmit knowledge of mathematical models, and modern theoretical and computational techniques, as a means of solving complex problems.

TG 2: Logical Reasoning Skills -To develop students' ability to reason logically, using precise language and various forms of abstraction and generalization.

TG 3: Effective Communication Skills -To insure that students are able to read and comprehend texts with significant mathematical content, and communicate mathematical ideas with clarity and coherence, in both oral and written form.

TG 4: Mathematical Inspiration, Breadth and Depth - To promote the realization that concepts across the mathematical curriculum fit together. To reinforce mathematical inspiration through an in-depth study of one or more advanced areas of undergraduate mathematics.

TG 5: Career Readiness-To prepare students for employment in a mathematically related field, or for graduate study requiring mathematical sophistication.

Program Student Learning Outcomes
PSLO1: Formulate and Analyze Mathematical Problems - Students will demonstrate the ability to solve mathematical problems, including problems of nonacademic interest. To this end, students will be able to accurately formulate problems in mathematical terms,

articulate their assumptions, design a mathematical model, and solve the problem using appropriate methods (M1, M2, M3).

PSLO2: Perform Effective Computations - As an aid in solving mathematical problems, students will be able to use, verify, and check well-known techniques of calculation. This includes the ability to use well-known computer algebra systems (CAS), such as Matlab, Mathematica or Maple, to implement such calculations. The outcomes will be the ability to design and perform symbolic computations or numerical algorithms to solve mathematical problems, the ability to write and run computer programs, and the ability to interpret the results of a calculation (M1, M2, M3).

PSLO3: Use Logical Arguments and Mathematical Proofs - Logical reasoning will be demonstrated by the student's understanding of mathematical techniques of proof and how they apply. The outcome includes the ability to read and comprehend a mathematical argument, identifying any flaws in reasoning, the ability to write formal mathematical proofs, and the ability to use abstraction and generalization to make test conjunctures (M3, M4).

PSLO4: Recognize Mathematical Patterns and Phenomena - Students will recognize mathematical phenomena and be able to abstract, generalize and specialize patterns in order to analyze them mathematically. The outcome is the ability to recognize connections from a broad array of mathematical concepts (M1, M2, M3, M4).

PSLO5: Oral and Written Communication - Students will be able to express themselves with soundly reasoned and well organized writing and oral communication. These communication skills include the ability to collaborate with peers to solve mathematical problems (M1, M2, M3, M4).

Measures

M1. MATH 4480– Mathematical Modeling; Technique/Rigor, Concept Understanding/Mathematical Writing

M2. MATH 4850 – Stochastic Modeling; Technique/Rigor, Concept Understanding/Mathematical Writing

M3. Senior Exit Survey

M4. MATH 4310 – Modern Analysis 1; Technique/Rigor, Concept Understanding/Mathematical Writing

Part Two: Results of Assessment Activities

Physics, BS
Updated: Fall 2015
Chair: Jim Burkhart
Coordinator: Tom Christensen

Part One: Assurance of Student Learning Plan

Program Student Learning Outcomes
 PSLO1: Apply the fundamental ideas and methods of physics and be able to analyze problems using these skills (M1, M2).

 PSLO2: Knowledge and skills related to conducting research in physics. (M2).

 PSLO3: Knowledge and skills related to data analysis and presentation (M2).

 PSLO4: Students will be able to prepare and present several research topics and defend them before peers and faculty both orally and in writing (M1, M2).

Measures
 M1. Senior Seminar Oral Presentation
 M2. Exit Survey

Part Two: Results of Assessment Activities

PSLO1: apply the fundamental ideas and methods of physics and be able to analyze problems using these skills

 Sr. Seminar Oral Presentation
 All 12 students were rated by multiple faculty and scored as proficient or better meeting our goal. Average scores ranged from 86 to 97%.

 Exit Survey
 We use the CU-Boulder CLASS instrument as our exit survey. This measures the "expert-like" response of students to a set of 42 questions. These responses are then broken down into scores in particular categories. Our students' overall score was 76.5 which is very similar to previous years and compares favorably with a 59 score typical of Freshman students entering a General Physics class indicating a gain of about 17 points.

PSLO2: Knowledge and skills related to conducting research in physics

 Our students generally scored well on the content items of the Oral presentation rubric. The overall score on the CLASS instrument suggested that most students had developed expert-like thinking in Physics. Two sub-areas which were the weakest are conceptual understanding (score of 63.6 – compared to freshmen at 55) and applied conceptual understanding (score of 51.9 – compared to freshmen at 47). Both of these scores are lower for this year's group of students than for the previous year's students. Although the average for our students was acceptable, three students scored below a 70 overall (2

of these were 69). This is slightly greater than our goal of 75% having a score of 70 or above. No clear pattern is suggested here, but our weakest students appear to be right at the border for proficiency. We will need to monitor the area of conceptual understanding in future years to make sure that it is acceptable.

PSLO3: knowledge and skills related to data analysis and presentation

Exit Survey
We use the CU-Boulder CLASS instrument as our exit survey. This measures the "expert-like" response of students to a set of 42 questions. These responses are then broken down into scores in particular categories. Our students' overall scores was 76.5 which is very similar to previous years and compares favorably with a 59 score typical of Freshman students entering a General Physics class.

Instrumentation Lab Projects
Due to a communication problem with the assessment coordinator, this assessment was only conducted by one faculty member and then reviewed by a second faculty member after the assessment was completed. Both faculty concluded that all students had demonstrated sufficient knowledge and skills.

Summary for findings for PSLO3 and Associated Measures
The Instrumentation Lab projects suggest that students have acceptable data analysis and data presentation abilities. The CLASS instrument did not indicate any particular problems in how students think about data.

PSLO4: Students will be able to prepare and present several research topics and defend them before peers and faculty both orally and in writing

Sr. Seminar Oral Presentation
All 12 students were rated by multiple faculty and scored as proficient or better meeting our goal. Average scores ranged from 86 to 97%.

Instrumentation Lab Projects
Due to a communication problem with the assessment coordinator, this assessment was only conducted by one faculty member and then reviewed by a second faculty member after the assessment was completed. Both faculty concluded that all students had demonstrated sufficient written abilities.

Summary of Findings for PSLO4 and Associated Measures
The Senior seminar presentations indicate good ability in oral presentations for those items on the rubric relating to presentation skills. The Instrumentation lab projects demonstrated acceptable written skills

Other Indicators of Student Learning

FCQ scores

All upper division FCQ scores at the course level and averaged to the program level exceeded the minimum goal. The only concern noted was in the first semester of the instrumentation lab which had low scores. This class has been a problem in the past and significant changes in course design were done between the 1st and 2nd semesters. These resulted in significantly higher ratings for the 2nd semester course. We will continue to monitor this course

Overall Summary of Assessment Results

Several faculty in the department are introducing more active learning elements into their classrooms to examine the impact on student learning. Flipped classrooms, Just-in-Time Teaching activities, and peer learning activities have all been attempted in various classes. Given the relatively small sample sizes, these activities have not clearly had an impact on student learning so far – but have generally been well received by students. We restructured the 2nd semester of Instrumentation Lab after the 1st semester received very low FCQ scores. This appears to have helped considerably.

Physics, MSc
Updated: Fall 2015
Chair: Jim Burkhart
Coordinator: Tom Christensen

Part One: Assurance of Student Learning Plan

Program Student Learning Outcomes

PSLO1: Ability to conduct research in physics at a level appropriate to the master's degree (M1, M2).

PSLO2: Ability to compile, analyze, and present data from their physics projects at an advanced level appropriate to their master's degree (M1, M2).

PSLO3: Prepare and present a detailed research paper and defend it before their peers and faculty. This will require development of oral and written skills at an advanced level appropriate to the master's degree (M1, M2).

Measures

M1. Thesis – oral presentation
M2. Thesis – written

Part Two: Results of Assessment Activities

PSLO1: ability to conduct research in physics at a level appropriate to the master's degree

Thesis – oral presentation
Two students – both rated proficient

Thesis – written
Two students – both rated proficient
Summary of Findings for PSLO1 and Associated Measures

Summary of Findings for PSLO1 and Associated Measures
We graduated two students during the academic year. Both were examined by a thesis committee consisting of three faculty. The faculty were in agreement that both students were proficient which satisfies our goal. One faculty member felt that one student did not express their research question very clearly

PSLO2: ability to compile, analyze, and present data from their physics projects at an advanced level appropriate to their master's degree

Thesis – oral presentation
Two students – both rated proficient
Thesis – written
Two students – both rated proficient

Summary of Findings for PSLO2 and Associated Measures
We graduated two students during the academic year. Both were examined by a thesis committee consisting of three faculty. The faculty were in agreement that both students were proficient which satisfies our goal. One faculty member felt that one student did not provide a clear interpretation of the results of the research

PSLO3: prepare and present a detailed research paper and defend it before their peers and faculty. This will require development of oral and written skills at an advanced level appropriate to the master's degree.

Thesis – oral presentation
Two students – both rated proficient

Thesis – written
Two students – both rated proficient

Summary of findings from PSLO3 and Associated Measures
We graduated two students during the academic year. Both were examined by a thesis committee consisting of three faculty. The faculty were in agreement that both students

were proficient which satisfies our goal. One faculty member felt that one student needed some work on the literature review and in answering questions. The same faculty member felt that the other student tended to ramble some in the organization of their presentation.

Other Indicators of Student Learning
FCQ scores
The individual course and program average FCQ scores exceeded the minimum required.

Overall Summary of Assessment Results
With only one or two students graduating with this degree each year, we are still watching the data to see if any clear trends develop as opposed to issues which are isolated to particular students. So far, the main issue has been poor organization of presentations. This past year, we developed a handbook for our graduate students that more clearly outlines our expectations for the students.

APPENDIX: Measures

Anthropology, BA - M1. Senior Seminar Paper Assignment

	25 pts	20 pts*	15 pts	10 pts	0 pts
Critical Reading (SLO #1)	Novel critique of argument	Places critique in appropriate context (e.g., places critique of the status of Nariokotome within the debate about use of cladistics in hominid taxonomy)	Identifies strengths and weaknesses (e.g., can enumerate pros and cons of placing Nariokotome within *Homo erectus*)	Accurately summarizes results or conclusions (e.g., summarizes Bernard Wood's reasons for considering Nariokotome *Homo erectus*)	No attempt at critical reading
Integrate ideas (SLO #2; 3)	Novel integration of disparate ideas	Uses separate perspective to evaluate similarities and differences (e.g., uses knowledge of modern behavioral ecology to contrast the grandmother hypothesis with the male	Directly compares or contrasts different ideas (e.g., compares the grandmother hypothesis to the male provisioning model)	Accurately identifies major ideas (e.g., identifies the grandmother hypothesis as important to discussions of *Homo erectus)*	Inability to identify an idea

		provisioning model)			
Handle data (SLO #2; 3)	Marshalls data from multiple, disparate sources in defense of a novel thesis	Connects data from one source to interpretations from another (e.g., uses data from archaeology to augment or counter fossil evidence)	Draws specific connections between data and interpretation (e.g., can cite specific anatomical evidence for thinking that Nariokotome was an endurance runner)	Summarizes data (e.g., summarizes anatomical description of Nariokotome)	Does not identify relevant data
Knowledge of core concepts (SLO #4; 5)	Applies core concepts in novel ways	Uses core concepts with facility as part of regular discourse (e.g., demonstrates facility with natural selection in discussing evolution of *Homo erectus*)	Uses core concepts appropriately but without facility (e.g., invokes natural selection in discussing evolution of *Homo erectus*)	Uses terms for core concepts without clear understanding (e.g., mentions natural selection but does not actually incorporate it into the discussion)	No evidence of core concepts
Background Research	Accesses novel resources	Reliance on journal articles, scholarly books and monographs, and appropriate on-line resources	Partial reliance on academic sources, along with popular sources	Sole reliance on popular sources (unless that is the subject of analysis) and books; encyclopedias	Paraphrased, invented, or drawn uncritically from unattributed sources

If an essay falls in this column on all five criteria, then it would earn 100 pts (100%). The left hand column is there to reward truly exceptional essays. It is unlikely any essay would fall in the left column on all criteria.

M2. Senior Seminar Research Project – copy not yet available

M3. Exit Survey
Anthropology, BA/Senior Seminar Capstone Course Exit Survey and Alumnae Contact Sheet

Please provide contact information so that we can send you alumnae materials after you graduate:

Name:
Email Address:
Phone:
Residential Address:

EXIT SURVEY for UCCS Anthropology Major Seniors

What is your career goal after graduating with your BA in Anthropology?

Do you expect to work within a field that will utilize anthropology?

Directly ___
Indirectly ___

Please explain:

Are you planning to attend a graduate school program?

If so, in what field?

What universities and what programs are you applying to?

Have you already applied?

On a scale of 1 to 5 (1=lowest; 5=highest), how well do you feel prepared to take your next step (whether via graduate study or a next career step based on your education in the Anthropology program at UCCS?   1 __ 2 __ 3 __ 4 __ 5 __
Please explain:

Please rate the following skills (1=lowest – 5= highest) in terms of your perceived current aptitude based on your Anthropology education overall:

Critical Reading: 1 __ 2 __ 3 __ 4 __ 5 __

Integration of Ideas: 1 __ 2 __ 3 __ 4 __ 5 __

Ability to effectively utilize data: 1 __ 2 __ 3 __ 4 __ 5 __

Knowledge of core concepts in Anthropology within each of the following :

Cultural Anthropology: 1 __ 2 __ 3 __ 4 __ 5 __

Archaeology: 1 __ 2 __ 3 __ 4 __ 5 __

Linguistic Anthropology: 1 __ 2 __ 3 __ 4 __ 5 __

Physical/ Biological Anthropology: 1 __ 2 __ 3 __ 4 __ 5 __

M4. In-class Presentation – copy not yet available

M5. FCQ #2, ANTH 4980

Additional FCQ Questions for ANTHROPOLOGY ASSESSMENT (Fall 2015-)
For ANTH 1020, 1030, 1040, 2800:

"Please rate your competency level in defining and explaining core anthropological concepts".

For 3970, 4980:
"Please rate your competency level in defining and explaining core anthropological concepts".

"Please rate your proficiency level in comparing and contrasting theoretical and methodological foundations in at least two sub-disciplines of anthropology."

Biology, BS Measures
Measures
M1. Pre/Post (Intro Bio II and Senior Seminar)

BIOL 4010 – Evaluation Form (Hines)
Presenter's Name _____
Title: _____
Comments:
Oral Presentation

Performance Indicators, below *Components related to your program level student learning outcomes*	1 Below average Unacceptable (consider this a "C" or below effort)	2 Average Typically the minimal acceptable performance level (consider this a "B" effort)	3 Above Average Exemplary (consider this an "A" effort)	Score
Organization* Defined: Specific introduction and conclusion, sequenced material within the body, and transitions. Conveys	Presentation is somewhat organized but it is apparent that some of the information is presented out of sequence. Does not	Information is presented in a logical sequence and manner. No more than two of the transitions are under-developed. Conveys	Information is presented in a logical sequence and manner. Development of ideas is easy to follow. Transitions are well-	

a clear and concise central message (i.e. hypothesis).	convey a concise, clear central message.	a concise, clear central message.	developed. Conveys a concise, clear central message.	
Subject/Content Knowledge* Defined: Use of supporting evidence to demonstrate and support content/conclusion. Ability to respond to questions.	Aware of content, but displays lack of confidence with topic and able to provide only minimal response to even basic questions. Minimal use of or reference to evidence to support content/conclusion.	Demonstrates strong knowledge of topic, at ease with responding to most questions. Uses some evidence to support the presentation content/conclusion.	Demonstrates full knowledge of topic by anticipating and addressing potential questions within the presentation. Additionally addresses questions from audience with authority and east. Effective use of evidence to fully demonstrate and support content/conclusion.	
Language* Defined: Language in presentation is appropriate to discipline, topic and audience.	Language choices are not consistently appropriate to the discipline, topic and/or audience. Does not clearly illustrate and explain the topic and findings with the appropriate language.	Language choices are largely appropriate to the discipline, topic and/or audience. Language is used to clearly illustrate and explain the topic and findings, with few errors.	Language choices are consistently appropriate to the discipline, topic and audience. Language is appropriately used to clearly illustrate and explain the topic and findings.	
Delivery* Defined: Delivery techniques; posture, gesture, eye contact, and vocal expressiveness.	Delivery detracts from the understandability of the presentation, and the speaker appears uncomfortable or tentative.	Delivery enhances the presentation, keeps audience interested and speaker appears comfortable with topic and in front of an audience.	Delivery enhances the presentation, keeping it compelling and informative, engages audience and speaker appears well-rehearsed and confident.	
Supporting Material* Defined: Supporting materials; explanations, examples, illustrations, statistics, analogies, relevant quotations, samples.	Insufficient supporting materials, makes reference to information or analysis that minimally supports the presentation or establishes the presentation or establishes the presenter's credibility/authority on the topic.	Supporting materials make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/authority on the topic.	Appropriate variety of supporting materials reference information or analysis that significantly supports the presentation or establishes the presenter's credibility/authority on the topic.	

| Use of Communication Media/Aids Defined: Communication aids (powerpoint, videos, etc.) are utilized appropriately and effectively. | Communication aids are poorly prepared or used inappropriately. Font is too small; unable to discern main points; figures/tables are not clearly labelled or hard to see. | Communication aids contribute to the quality presentation, but could be improved upon. Certain aspects were not clear or legible, and/or main points were not always conveyed. | Communication aids enhance the quality of the presentation. Sufficiently-sized font, clearly labelled and viewable figures/tables, provides appropriate bullets to highlight main points. | |

*Adapted from Association of American Colleges and Universities, aacu.org

M2. Senior Survey - UCCS Biology Program Senior Survey

Congratulations Biology Seniors - you are on the way to graduating from UCCS! Before you leave us, we would love to get your feedback in order for us to enhance the quality of the program. We wish you the best with your future endeavors, and please keep in touch to let us know what you are up to!

Please select the best answer for each question (or statement) and completely fill in the corresponding bubble on the provided scantron. Unless indicated, only mark one answer per question. The responses on this survey are completely anonymous. You do not need to enter your name or your student ID on the scantron.
Please provide the following information on the scantron:
-Date: Semester and year (e.g. Fall 2013)
-Subject: Senior Survey
What is your gender identity?
Male
Female
Other

Which racial/ethnic groups describe you? (you may mark more than one)
American Indian, Alaskan Native, Pacific Islander
Black or African American
Hispanic or Latino
Asian, Native Hawaiian, Other
Caucasian

How many years after you finished high school did you start your education at UCCS?
Within 1 year
2-3 years
4-6 years
7 or more years

What was the highest level of education that you had completed prior to attending UCCS?
High school or High school equivalent
Associate's degree

Bachelor's degree
Technical degree
Graduate degree (such as Master's or Doctorate)

What was the highest level of education completed by your parents?
Less than high school
High school/GED
College and/or technical degree
Graduate degree (such as Master's or Doctorate)
Other/don't know

At least one of my parents is employed in a STEM field (Science, Technology, Engineering, Math).

Yes
No
I don't know

Which of the following best describes your employment status while a student at UCCS?
Not employed
Employed Part-time
Employed Full-time

Which of the following best describes your enrollment status while a student at UCCS?
Full-time student
Part-time student

Did you need financial assistance (loans, financial aid, PELL grant, etc) in order to complete your college education?
Yes
No

Did you transfer to UCCS from another college?
No
Yes, from a 2-year community college
Yes, from a 4-year college
Yes, from other

What are your goals after graduating?
Find employment in a STEM field (Science, Technology, Engineering, Math; includes Health Professionals)
Pursue postgraduate education in a STEM field (Science, Technology, Engineering, Math; includes Health Professionals)
Find employment in an area unrelated to STEM
Purse education in a non-STEM field.
Other

Have you applied to a graduate program?
Yes, already accepted
Yes, in process of applying
No

What type of graduate program are you interested in pursuing?
Not interested in pursuing more education
Master's (or similar) program
PhD (or similar) program
M.D./D.O program or other health-related professional program (dental, pharmacy, P.A., etc)
Other

Where did you complete your lower-level general biology lab that introduces concepts in cellular and molecular biology?
Online
At UCCS (BIOL 1210)
At PPCC (BIO 111) or another community college
At another 4-year institution
Other

In the introductory cellular & molecular lab course, did you participate in the Soakin' Up the Rays with *S. Pombe* module at UCCS or PPCC (this is the module where yeast are exposed to UV and screened for mutants in the DNA Damage Response pathway)?
Did not take this course at UCCS or PPCC
yes
no

Have you completed an upper-level biology lab during your undergraduate career (genetics lab, evolutionary genetics lab, advanced anatomy lab, etc)?
Yes
No

Have you performed any biological research outside of your coursework?
Yes, in a hospital setting
Yes, in a professor's lab
Yes, but not in a hospital or a professor's lab
No

Based on your undergraduate education, please respond to the following statements (18-29) using the scale provided below:

A	B	C	D	E
Strongly agree	Agree	Neutral	Disagree	Strongly disagree

- My biology coursework enhanced my interest in the biological sciences.
- My biology coursework increased my understanding of the biological sciences.
- My biology coursework has prepared me for pursuing employment or graduate/professional school in the sciences.
- My introductory-level biology coursework prepared me for upper-level courses.
- My biology laboratory coursework enhanced my understanding of biomedical research.
- My biology laboratory coursework increased my interest in research.
- My biology laboratory coursework increased my interest in pursuing a research career.
- My biology laboratory coursework gave me a better understanding of concepts covered in lecture courses.
- Overall, I feel capable of applying biological theory to current issues outside of the classroom (i.e. global warming, stem cell research, etc.).
- Overall, I feel well-prepared in the biological sciences.
- Overall, I feel well-prepared in the non-biological sciences.
- Overall, I feel well-prepared outside of the sciences.

For questions 30-40, how much experience in the following areas did your undergraduate biology education provide for you?

A	B	C	D	E
Extensive experience	Sufficient experience	Some experience	Minimal experience	No experience

- Communication of biological concepts to others.
- Analytical thinking
- Interpreting scientific literature.
- Interpreting scientific experiments.
- Generating scientific hypotheses.
- Identifying limitations of research methods and designs.
- Working effectively as part of a team.
- Formulating my own science-related ideas.
- Integrating theory and practice.
- Managing a business.
- Bioinformatics - applying computer technology to conduct biological research.

Based on what you learned from your undergraduate biology education, rate your level of agreement with the following statements (41-52):

A	B	C	D	E
Strongly agree	Agree	Neutral	Disagree	Strongly disagree

- The diversity of life evolved over time by processes of mutation and selection.
- Basic units of structure define the function of all living things.
- Growth and behavior of organisms are influenced by genetic and environmental factors.
- Organisms are governed by the laws of thermodynamics.
- Living systems are autonomous (self-sufficient and are not interconnected).
- The study of biology is all about memorizing facts.
- Biology is evidence-based and grounded in the formal practices of observation, experimentation, and hypothesis testing.
- Biology relies on applications of quantitative analysis and mathematical reasoning.
- Biologists should be able to communicate biological concepts and interpretations to scientists in other disciplines.
- It is not helpful to learn other subjects (Chemistry, physics, etc.) in order to understand biology.
- Biology bridges relationships between science and society.
- Since nothing in science is known for certain, all theories are equally valid.

Please feel free to use the back of the scantron to provide specific comments that will help us enhance the quality of the program. Thank you for completing this survey!
We greatly appreciate your valuable feedback!

Biology, MSc Measures

Measures
M1. Proposal Presentation
M2. Thesis or Research Paper – Thesis or Research paper/project Evaluation Form
Student's Name _____
Advisor's Name _____
Second Advisory Committee Member's Name _____
Third Advisory Committee Member's Name _____
Fourth Advisory Committee Member's Name _____
Title of Thesis or Research paper/project _____
Date Submitted _____
Date of Oral Presentation _____
Note: The student does not see these comments; they are used to evaluate the MSc Biology program

PART ONE: THESIS SKILLS ASSESSMENT

Performance Indicators, below *Components related to your program level student learning outcomes*	1 Below average Unacceptable for Master's Level Performance (consider this a "C" or below effort)	2 Average Typically the minimal acceptable performance level (consider this a "B" effort)	3 Above Average Exemplary (consider this an "A" effort)	Score
Introduction The introduction justifies the rationale for conducting the	The research question, hypothesis, or	The research question, hypothesis, or	The research question, hypothesis, or	

study/project. It should give sufficient detail for the reader to understand why the topic is of interest and what research question, hypothesis, or project objective will be addressed.	project objective is unclear or ambiguous. Justification for the study/project is weak.	project objective is stated and reasonably justified.	project objective is well articulated and justification for the study/project is strong.	
Literature Review: The literature review summarizes all relevant literature pertaining to the study/project.	Incomplete. Lacks organization and/or clarity.	Includes all relevant literature and is organized in a logical manner.	All relevant literature is addressed and integrated into a narrative that adds insight into the topic.	
Method: Components of the methods section are discipline specific, but should provide a detailed description of the how the hypotheses were tested or objectives were accomplished.	Incomplete. The study/project could not be replicated from the information provided.	All major components of the methods are addressed. Any omissions are minor.	The methods are clear, concise, and comprehensive. The study could be replicated from the information provided.	
Results Compiles, collates and presents data, analyses, findings, and/or outcomes.	Incomplete or incorrect. Missing critical tables, figures, or analyses.	All critical data, analyses, findings, and/or outcomes are presented and correct. Tables and figures are organized and legible.	All data are clearly presented in text, tables, and/or figures. Supplementary information is also provided.	
Discussion/Conclusions Interprets the results and addresses how the findings/accomplishments add to body of scientific knowledge.	Incorrectly or inadequately interprets the results or outcomes of the study/project. No new insight is gained.	Correctly interprets the findings, reaches a logical conclusion, and provides reasonable recommendations for future work.	Articulately addresses how the findings/outcomes of the work add to scientific knowledge and gives insightful directions for future work.	
Formatting Based on discipline-specific guidelines for publication	Formatting fails to meet several (more than 3) formatting requirements	Formatting meets all but a few (1 to 3) formatting requirements	No formatting errors. Submission for publication requires only minor modifications.	

M3. Thesis or Research Paper – Oral Presentation

Performance Indicators, below *Components related to your program level student learning outcomes*	1 Below average Unacceptable for Master's Level Performance (consider this a "C" or below effort)	2 Average Typically the minimal acceptable performance level (consider this a "B" effort)	3 Above Average Exemplary (consider this an "A" effort)	Score
Organization* Defined: Specific introduction and conclusion, sequenced material	Presentation is somewhat organized but it is apparent that some of the information is	Information is presented in a logical sequence and manner. No more than two of the	Information is presented in a logical sequence and manner. Development of ideas	

within the body, and transitions. Conveys a clear and concise central message (i.e. hypothesis).	presented out of sequence. Does not convey a concise, clear central message.	transitions are under-developed. Conveys a concise, clear central message.	is easy to follow. Transitions are well-developed. Conveys a concise, clear central message.	
Subject/Content Knowledge* Defined: Use of supporting evidence to demonstrate and support content/conclusion. Ability to respond to questions.	Aware of content, but displays lack of confidence with topic and able to provide only minimal response to even basic questions. Minimal use of or reference to evidence to support content/conclusion.	Demonstrates strong knowledge of topic, at ease with responding to most questions. Uses some evidence to support the presentation content/conclusion.	Demonstrates full knowledge of topic by anticipating and addressing potential questions within the presentation. Additionally addresses questions from audience with authority and east. Effective use of evidence to fully demonstrate and support content/conclusion.	
Language* Defined: Language in presentation is appropriate to discipline, topic and audience.	Language choices are not consistently appropriate to the discipline, topic and/or audience. Does not clearly illustrate and explain the topic and findings with the appropriate language.	Language choices are largely appropriate to the discipline, topic and/or audience. Language is used to clearly illustrate and explain the topic and findings, with few errors.	Language choices are consistently appropriate to the discipline, topic and audience. Language is appropriately used to clearly illustrate and explain the topic and findings.	
Delivery* Defined: Delivery techniques; posture, gesture, eye contact, and vocal expressiveness.	Delivery detracts from the understandability of the presentation, and the speaker appears uncomfortable or tentative.	Delivery enhances the presentation, keeps audience interested and speaker appears comfortable with topic and in front of an audience.	Delivery enhances the presentation, keeping it compelling and informative, engages audience and speaker appears well-rehearsed and confident.	
Supporting Material* Defined: Supporting materials; explanations, examples, illustrations, statistics, analogies, relevant quotations, samples.	Insufficient supporting materials, makes reference to information or analysis that minimally supports the presentation or establishes the presentation or establishes the presenter's credibility/authority on the topic.	Supporting materials make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/authority on the topic.	Appropriate variety of supporting materials reference information or analysis that significantly supports the presentation or establishes the presenter's credibility/authority on the topic.	
Use of Communication Media/Aids Defined:	Communication aids are poorly prepared or used inappropriately. Font	Communication aids contribute to the quality presentation, but could be	Communication aids enhance the quality of the presentation. Sufficiently-sized font,	

| Communication aids (powerpoint, videos, etc.) are utilized appropriately and effectively. | is too small; unable to discern main points; figures/tables are not clearly labelled or hard to see. | improved upon. Certain aspects were not clear or legible, and/or main points were not always conveyed. | clearly labelled and viewable figures/tables, provides appropriate bullets to highlight main points. | |

*Adapted from Association of American Colleges and Universities, aacu.org

M4. Exit Interview

Part A. General background
Name:
Degree Option:
Thesis or paper (circle one)
Date of thesis defense:

I. Post-graduation plans
Have you made any efforts to seek employment?   Yes   No
If yes, with what organizations have you applied to or interviewed with?

Have you obtained a job?   Yes   No
If yes,
Job Description (title):
Salary (or Salary Range):
Number of job offers:
If above is not applicable, do you plan to go to PhD or a Professional School for further studies?
         Yes   No
If yes, Discipline: Location: Degree seeking:
Other:

Part B. Self evaluation
Please assess your ability/knowledge gained in the following areas:
5 = excellent
4 = very good
3 = adequate
2 = needs improvement
1= needs considerable improvement

	5	4	3	2	1
1. In-depth knowledge in your specific discipline of biology					
2. Ability to apply your knowledge of biology					
3. Ability to design and conduct experiments and to analyze and interpret data					
3. Ability to communicate effectively (oral)					
4. Ability to communicate effectively (written)					
5. Understanding of professional and ethical responsibilities					
6. Recognition of the need to engage in life-long learning					
7. Knowledge of contemporary biological science issues					

Please identify the courses or experiences (including student organizations) where you acquired ability/knowledge for each of the above areas.

If you wish, please use the space below to elaborate on any of your responses on the prior page:

Part C. Program evaluation
Student Learning Objectives 1&2: Increased knowledge of theories/concepts in your discipline/option.
1. Did the program increase your knowledge of scholarship and new developments in your area of expertise?

2. Do you feel that your program was lacking in a particular area?

Student Learning Objective 3: A fundamental understanding of the scientific method and be capable of critical thinking.
1. Did your graduate experience provide you the necessary background to understand the scientific method?

2. Do you feel that you can use critical thinking to address problems?
Student Learning Objective 4: Strong written communication skills.
Did the program increase your written communication skills?

Student Learning Objective 5: Strong oral communication skills
Did the program increase your oral communication skills?

Student Learning Objective 6: Be prepared to enter a PhD program or nonacademic position.
1. Did your graduate experience provide you the necessary background to conduct original research?

2. Do you feel that you are prepared to enter a PhD program or a non-academic position?

Student Learning Objective 7: Be prepared to be an active member of your professional community.
1. Did the program increase your knowledge of professional development and professional activities?

2. Do you currently participate in professional societies and activities?

Additional Questions:
1. Did you encounter specific problems as a graduate student in this Department?

2. If so, how might have those problems have avoided or corrected?

3. Were the faculty, staff and Department administrators helpful and supportive?

4. What are the strengths and weaknesses of the advising materials and procedures?

5. Would you choose graduate work in Biology at UCCS if you had to make the choice again? Please explain your response.

6. Do you have any suggestions as to how our Department might attract minority graduate students and be more sensitive to issues of cultural diversity?

M5. Student Evaluation of Program

Chemistry, BABS Measures

Part 1
Chemistry, BA Oral Presentation Rubric
Name: Date:
Score:
Select the box which best describes student performance. Alternatively you can "split the indicators" by using the check boxes to evaluate each item individually.

	Exceeds Standard – 3	Meets Standard – 2	Nearly Meets Standards – 1	Does Not Meet Standard – 0	Score
Language Use and Delivery The student communicates ideas effectively.	Effectively uses eye contact. Speaks clearly, effectively, and confidently using suitable volume and pace. Fully engages the audience. Dresses appropriately, Selects rich and varied words for context and uses correct grammar.	Maintains eye contact. Speaks clearly and uses suitable volume and pace. Takes steps to engage the audience. Dresses appropriately. Selects words appropriate for context and uses correct grammar.	Some eye contact, but not maintained. Speaks clearly and unclearly in different portions. Occasionally engages audience. Dresses inappropriately. Selects words inappropriate for context; uses incorrect grammar.	Uses eye contact ineffectively. Fails to speak clearly and audibly and uses unsuitable pace. Does not engage audience. Dresses inappropriately. Selects words inappropriate for context; uses incorrect grammar.	
Organization and Preparation The student exhibits logical organization.	Introduces the topic clearly and creatively. Maintains clear focus on the topic. Effectively includes smooth transitions to connect key points. Ends with logical, effective and relevant conclusion.	Introduces the topic clearly. Maintains focus on the topic. Include transitions to connect key points. Ends with coherent conclusion based on evidence.	Introduces the topic. Somewhat maintains focus on the topic. Includes some transitions to connect key points. Ends with a conclusion based on evidence.	Does not clearly introduce the topic. Does not establish or maintain focus on the topic. Uses ineffective transitions that rarely connect points. Ends without a conclusion.	

Content The student explains the process and findings of the project and the resulting learning.	Clearly defines the topic or thesis and its significance. Supports the thesis and key findings with an analysis of relevant and accurate evidence Provides evidence of extensive and valid research with multiple and varied sources Provides evidence of complex problem solving and learning stretch. Combines and evaluates existing ideas to form new insights.	Clearly defines the topic or thesis. Supports the thesis and key findings with evidence. Presents evidence of valid research with multiple sources. Provides evidence of problem solving and learning stretch. Combines existing ideas to form new insights.	Defines the topic or thesis. Supports the thesis with evidence. Presents evidence of research with sources. Provides some evidence of problem solving and learning stretch. Combines existing ideas.	Does not clearly define the topic or thesis. Does not support the thesis with evidence. Presents little or no evidence of valid research. Shows little evidence of problem solving and learning stretch. Shows little evidence of the combination of ideas.	
Questions and Answers	Demonstrates extensive knowledge of the topic by responding confidently, precisely and appropriately to all audience questions and feedback.	Demonstrates knowledge of the topic by responding accurately and appropriately to questions and feedback.	Demonstrates some knowledge of the topic by responding accurately and appropriately to questions and feedback.	Demonstrates incomplete knowledge of the topic by responding inaccurately and inappropriately to questions and feedback.	

Adapted from https://www.cte.cornell.edu/documents/Science%20Rubrics.pdf
Original retrieved 10/6/2015, David Anderson/UCCS Chemistry Department

M3. Part 2

Chemistry BA, Writing Rubric
Name: Date: _____Score:

Category	Exceeds Standard 4	Meets Standard 3	Nearly Meets Standard 2	Does Not Meet Standard 1	No Evidence 0	Score
Title Page	Title Your Name Research Advisor's Name Date Neatly finished- no errors	Evidence of four	Evidence of three	Evidence of two or fewer	Absent	
Thesis Statement	Clearly and concisely states the paper's purpose in a single sentence, which is engaging and thought provoking.	Clearly states the paper's purpose in a single sentence.	States the paper's purpose in a single sentence.	Incomplete and/or unfocused.	Absent, no evidence	
Introduction	The introduction is engaging, states the main topic and previews the structure of the paper.	The introduction states the main topic and previews the structure of the paper.	The introduction states the main topic but does not adequately preview the structure of the paper.	There is no clear introduction or main topic and the structure of the paper is missing.	Absent, no evidence	
Body	Each paragraph has thoughtful supporting detail sentences that develop the main idea.	Each paragraph has sufficient supporting detail sentences that develop the main idea.	Each paragraph lacks supporting detail sentences.	Each paragraph fails to develop the main idea.	Not applicable	
Organization-Structural Development of the Idea	Writer demonstrates logical and subtle sequencing of ideas through well-developed	Paragraph development present but not perfected.	Logical organization; organization of ideas not fully developed.	No evidence of structure or organization.	Not applicable	

	paragraphs; transitions are used to enhance organization.					
Conclusion	The conclusion is engaging and restates the thesis.	The conclusion restates the thesis.	The conclusion does not adequately restate the thesis.	Incomplete and/or unfocused.	Absent	
Mechanics	No errors in punctuation, capitalization and spelling.	Almost no errors in punctuation, capitalization and spelling.	Many errors in punctuation, capitalization and spelling.	Numerous and distracting errors in punctuation, capitalization and spelling.	Not applicable	
Usage	No errors in sentence structure and word usage.	Almost no errors in sentence structure and word usage.	Many errors in sentence structure and word usage.	Numerous and distracting errors in sentence structure and word usage.	Not applicable	
Citation	All cited works, both text and visual, are done in the correct format with no errors.	Some cited works, both text and visual, are done in the correct format. Inconsistencies evident.	Few cited works, both text and visual, are done in the correct format.	Absent	Not applicable	
Bibliography	Done in the correct format with no errors. Includes more than 5 major references (*e.g.*, science journal articles, books, but no more than two internet sites; periodicals available online are not considered internet sites)	Done in the correct format with few errors. Includes 5 major references (*e.g.*, science journal articles, books, but no more than two internet sites; periodicals available online are not considered internet).	Done in the correct format with some errors. Includes 4 major references (*e.g.*, science journal articles, books, but no more than two internet sites; periodicals available online are not considered internet).	Done in the correct format with many errors. Includes 3 major references (*e.g.*, science journal articles, books, but no more than two internet sites; periodicals available online are not considered internet sites.)	Absent or the only sites are internet sites.	

Adapted from https://www.cte.cornell.edu/documents/Science%20Rubrics.pdf
Original retrieved 10/6/2015, David Anderson/UCCS Chemistry Department

M4. CHEM   3211 Survey

CHEM - Prep Lab Report	Exceeds Standard – 2 points	Meets Standard – 1 point	Does Not Meet Standard – 0 points
Header	Contains: Title/Your Name/ Lab Number/Date/Neatly finished – no errors	Missing 1 component	Missing 2–4 components
Purpose	Clear and concise statement of experimental objective: Product, reactants, method, isolation, purification, and characterization. Specific chemicals and methods must be specified.	Has general understanding but missing 1 component.	Has limited understanding and/or missing 2 or more components.
Chemical Reaction	Correctly represents structures of reactants and products and conditions.	Correct with minor structure error.	Missing or major errors or omissions.
Table of chemicals	Complete list of chemicals. Includes structures, formula, molecular weight and appropriate physical properties and quantities of Chemicals.	Missing up to 2 components: a chemical, or property, or has an unnecessary property.	Missing 3 or more components: chemicals or properties, or contains unnecessary properties.
Limiting Reagent and Theoretical Yield Calculation	Clearly identifies the limiting reagent and correctly calculates the theoretical yield for all reactants.	Clearly identifies the limiting reagent or has calculation error.	Missing or Incorrect identification of limiting reagent. Missing or incorrect set up of theoretical yield calculation.
Procedure	Two-column format used/Lists all steps in a detailed, sequential order that are easily followed in left column/Right column contains all data and observations/Provides detailed outcomes for each step/Steps and outcomes are aligned and related/Adequate space allowed for data and observations/Data recorded to correct precision and units.	Two-column format used/Missing up to 2 components: Lists all steps in a sequential order that are not easily followed/Provides unnecessary information is steps/Steps and outcomes slightly misaligned/Lacks detail in observations/Inadequate space allotted for observations/Data with Incorrect precision or units missing.	Does not use two-column format or missing 3 or more components: Steps missing or in an order that is not sequential, not easily followed, or incomplete/Provides unnecessary information/Steps missing outcomes or misaligned/Inadequate space allotted for observations/Data missing or with incorrect precision or missing units.
Calculations	Representative calculation of each type/Includes all outcomes for each type/Restatement or	Missing up to 2 components: Missing a calculation or outcomes.	Missing 3 or more components: Missing a calculation or outcomes.

	recalculation of Limiting reagent and theoretical yield/Clearly labeled and organized in a sequential manner/Includes units and correct significant figures.	Poorly organized or hard to follow. Missing units or incorrect significant figures.	Poorly organized or hard to follow. Missing units or incorrect significant figures.
Results and Discussion	Clearly states if purpose was achieved with data support/Complete and correct analysis of data is provided/Theory based errors consistent with results are provided.	Correct assessment of purpose but data support incomplete or missing up to 2 components: Data support incomplete/Analysis of data is provided with a few errors/Mostly theory based errors consistent with results are provided	Missing or incorrect assessment of purpose or missing 3 or more components: Data support is missing/Analysis of data is missing, incomplete or incorrect/Errors are missing or non-theory based errors or errors inconsistent with results are provided.
Mechanics	No errors in punctuation, capitalization, and spelling.	Few errors in punctuation, capitalization, and spelling.	Many errors in punctuation, capitalization, and spelling.
Usage	No errors sentence structure and word usage.	Few errors in sentence structure and word usage.	Many errors in sentence structure and word usage.

M5. Portfolio

Chemistry, MSc

UCCS MSc, Chemistry Option Program Student Exit Survey, 2015
Please rate your level of competency in each of the following focus areas:

(5=excellent; 4=very good; 3=good; 2=fair; 1=poor)

- Proficiency in use of the English language in preparing and completing reports .___
- Graduate-level proficiency in two or more of the five sub-disciplines of Chemistry: analytical, inorganic, organic, and physical Chemistry, and bioChemistry.___
- Teaching competence (Answer only if you taught labs at UCCS as an MSc student).___
- Ability to prepare and deliver Chemistry seminars/in-class lectures in Chemistry.___
- Knowledge and ability to discuss the CHEM ical literature related to your research area.___
- Ability to defend your research project during your final defense examination.___
- Submission of a high quality approved, final thesis to the Graduate School.___

UCCS MSc, Chemistry Option Learning Objectives

Use the same 1-5 scale as above to rate each item below.

Your development of the professional, analytical, problem solving and critical thinking skills required of an MSc student.___

Your demonstrated technical competency based on your performance in programmatic courses identified by you and the Program Director.___

Your demonstrated overall development as a CHEM ical researcher.___

Your demonstrated ability to communicate science in teaching laboratories (if applicable), seminars, oral reports, papers presented or submitted, and thesis defense.___

Your demonstrated ability to communicate science in written reports, posters presented or submitted, and thesis.___

Your demonstrated expertise in the development of the thesis and oral defense before the thesis committee and public.___

Your rating of the UCCS MSc program overall___.

UCCS Career Questions, please answer the questions using a few sentences for each.

Explain where you plan to go next after graduation and how you made your decision.

Explain how completing the MSc degree assisted or did not assist you in determining your career choice.

List the two top learning objectives that you mastered while working on your MSc degree.

List anything that you found missing from your MSc program.

Explain why you would or wouldn't recommend the MSc program to another BA/BS graduate.

M7. Course surveys

M8. Critique of oral research assignments

Geography and Environmental Studies, BA Measures

GES graduating senior survey/exit questionnaire.

How do you feel the Department of Geography and Environmental Studies has prepared you in the following areas:

Key

| Key2: 5 = I have developed advanced proficiency |
| 4 = I am proficient |
| 3 = I am somewhat proficient |
| 2 = I am less than proficient |
| 1 = I am not at all proficient |
| NA = not applicable |

1.	Understanding of the processes that shape the natural landscape	NA	1	2	3	4	5
2.	Understanding of the spatial processes that shape human society and landscapes	NA	1	2	3	4	5
3.	Understanding of geospatial tools and methods of analysis used to solve geographic problems	NA	1	2	3	4	5

 Please use the scale below to answer the following questions. At the end of the survey there is space provided for additional comments you may wish to make.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4.	I feel adequately prepared to work in fields related to my major	1	2	3	4	5

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.	I attained proficiency in my understanding of the physical processes that shape the earth.	1	2	3	4	5
6.	I attained proficiency in using and understanding geospatial technologies	1	2	3	4	5
7.	I attained proficiency in my knowledge of the human processes that shape the earth.	1	2	3	4	5
8.	I attained proficiency in my knowledge of most environmental problems the world faces	1	2	3	4	5
9.	I have a good understanding of the concept of sustainability.	1	2	3	4	5
10.	The GES major allowed me to develop my oral communication skills	1	2	3	4	5

B.-continued

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11.	My GES courses helped me significantly to improve my writing skills	1	2	3	4	5
12.	My GES courses enhanced my ability to think critically and analytically	1	2	3	4	5
13.	My GES courses enhanced my ability to conceptualize spatial relationships	1	2	3	4	5
14.	I know how to evaluate research sources for their quality and objectivity.	1	2	3	4	5
15.	I know how to evaluate research sources for their relevance to my topic of research.	1	2	3	4	5
16.	The GES faculty were easily accessible	1	2	3	4	5
17.	The GES faculty were approachable and supportive	1	2	3	4	5
18.	I am happy with the quality of the GES program	1	2	3	4	5

19. Were there any topical areas that were not covered in GES that you wished were?

20. Please include any additional comments you would like to make:

M3. Summit (Capstone) rubric

Student Name: Assessment mechanism (circle one):
Course:

Field; course journal, course reflection piece, course place-based exercise, course research paper.
Capstone: place-based questions, research paper, career preparation
Senior Honors Thesis or Senior Thesis
Other:

Program SLO	Above Average (3)	Average (2)	Below Average (1)	Points
Demonstrate an understanding of processes shaping Earth's landforms and environments				
Ability to observe and explain processes that shape landforms	Correctly identifies landform types and processes	Correctly identifies landform type but misunderstanding of how it was formed	Cannot identify landforms nor processes that shape them	
Ability to explain geographic factors driving climate patterns	Correctly understands the forces that influence climates; recognizes other similar climatic regions	Weaker understanding of the climate and factors shaping a region, limited global comparative ability	Limited understanding of the regional climate, others like it in similar geographic settings, or the factors driving that climate	
Understanding of the geographic factors shaping local vegetation communities	Strong understanding of the ecological and physical relationships forming a vegetation community	Partial understanding of the ecological and physical factors that determine vegetation communities	Limited understanding of how plants interact to form an ecological community, nor of the soil and climactic relationships forming it	
		Subtotal (sum points for category 1):		
		Total points possible for category 1:		
		Percentage:		
Recognize how the actions and behaviors of diverse cultures impact the natural environment and affect sustainability				
Ability to observe, record and explain	Recognizes key built landscape features	Can recognize unique human modifications	Poor recognition of the purposes or forms	

how people modify their environment.	and explains their historical development	but limited understanding of how they were built	of landscape elements or the factors that led to their creation	
Recognize the consequences of a human activity on land use and other activities	Sees connections between human activities and explains the impacts on other land uses and activities at various scales	Some recognition of the impacts human activities have across scale and on other dimensions, partial understanding of land use determinants	Poor recognition of the impacts human activities have on other activities and land uses, limited knowledge of key human geography sub fields.	
Recognize the characteristics that create a sense of place	Ability to see and explain how local characteristics create a unique place identity and people's attachment to place	Partial understanding of the ways people identify and connect to place, limited ability to connect landscape to place identity	Poor understanding of how humans develop place ties, poor ability to explain unique place characteristics	
Know sustainable resource management practices	Knowledge of tools and practices to conserve natural resources, has skills required to improve land health and water uses and quality	Partial knowledge of resource management practices, elementary skill sets to conserve resources	Poor knowledge of resource management practices, limited understanding of the consequences of poor resource management	
Recognize the elements and practices of an inclusive society	Accepting of diversity, empathetic with others, recognizes signs of intolerance	Modest awareness of inclusiveness, not fully aware of personal actions that can be exclusionary to others	Demonstrates interpretations that are ethnocentric, racist, sexist, or ideologically narrow	
		Subtotal (sum points for category 2):		
		Total points possible for category 2:		
		Percentage:		
Program SLO	Above Average (3)	Average (2)	Below Average (1)	Points
Demonstrate an understanding of the methods of analysis used to solve geographic problems and communicate effectively				
Ability to measure and/or map the spatial dimensions and relationships of human activities or physical processes	Creative analytical methods used, graphics and maps are professional	Spatial relationships are measured but in less robust manner, graphics might be less clear or of lesser quality	Limited spatial analysis performed, errors in cartography and visual presentations and/or analytical methods	
Appropriate selection and evaluation of research sources	Robust literature review, original summary of past research, cohesive	Literature review is acceptable but not used to inform student's position well	Poor review of literature, little connection literature and student's work	
Ability to develop and support a clear	Research question is clearly stated,	Development of thesis argument at	Difficult to follow argument, little	

argument, or thesis statement, in a research report	information is accurate, argument is cohesive.	times lacks clarity, could better employ evidence to make connections	evidence to support thesis	
Ability to analyze quantitative or qualitative data and interpret those data in a meaningful way	Innovative research design, robust data source, meaningful analysis and interpretation of results	Analysis could be stronger, interpretation of results might contain inaccuracies or miss key connections, results might be better communicated	Problems with data, analysis and/or results flawed, limited interpretation, unclear	
		Subtotal (sum points for category 3):		
		Total points possible for category 3:		
		Percentage:		

Geography and Environmental Studies, MA Measures

M1. Proposal Defense
M2. MA Exit Survey
GES graduating MA survey/exit questionnaire.

How do you feel the Department of Geography and Environmental Studies has prepared you in the following areas:

Key

Key2: 5 = I have developed advanced proficiency
4 = I am proficient
3 = I am somewhat proficient
2 = I am less than proficient
1 = I am not at all proficient
NA = not applicable

1.	Your ability to conceptualize a research topic and refine that broad interest into a focused research question	NA	1	2	3	4	5
2.	Your ability to apply analytical methods that enable you to answer a research question	NA	1	2	3	4	5
3.	Your ability to successfully complete an independent, original research thesis	NA	1	2	3	4	5
4.	Your ability to successfully communicate research findings to the public.	NA	1	2	3	4	5

Please use the scale below to answer the following questions. At the end of the survey there is space provided for additional comments you may wish to make.

		Strongly Disagree		Neutral		Strongly Agree
5.	I am adequately prepared to work in the fields related to my research emphasis.	1	2	3	4	5
6.	I attained proficiency in my understanding of and appreciation for the interactions between the human and natural world.	1	2	3	4	5
7.	I attained proficiency in skills to synthesize, analyze, and evaluate diverse social and physical information.	1	2	3	4	5
8.	I attained proficiency in my ability to conceptualize spatial relationships for problem solving.	1	2	3	4	5
9.	I developed communication skills to present solutions or recommendations clearly.	1	2	3	4	5
10.	I attained proficiency in using and understanding geospatial technologies.	1	2	3	4	5
11.	I have a good understanding of the concept of sustainability.	1	2	3	4	5
12.	My GES courses helped me significantly to improve my writing skills.	1	2	3	4	5
13.	My GES courses enhanced my ability to think critically and analytically.	1	2	3	4	5
14.	My GES courses enhanced my ability to conceptualize spatial relationships.	1	2	3	4	5
15.	I know how to evaluate research sources for their quality and objectivity.	1	2	3	4	5
16.	I know how to evaluate research sources for their relevance to my topic research.	1	2	3	4	5
17.	Advising was sufficient and helpful.	1	2	3	4	5
18.	My committee members were easily accessible.	1	2	3	4	5
19.	My committee members were approachable and supportive.	1	2	3	4	5
20.	I am happy with the quality of the GES MA program.	1	2	3	4	5

21. Please provide any additional comments you wish to make:

M3. Thesis Defense – oral
GES MA in Applied Geography Thesis Defense Evaluation
This student, _____, has been evaluated for these six criteria during their thesis defense. Date_____.
The criteria for evaluating a thesis defense are:

	Weak	-	Strong
1) Robustness and thoroughness of the literature review.	1	2	3
2) Clarify of the research question and objectives.	1	2	3
3) Competent application of appropriate research techniques.	1	2	3
4) Objective and accurate interpretation of the findings of the research.	1	2	3
5) Awareness of what new questions may be raised by the findings.	1	2	3
6) Clear, correct, and well-organized writing and presentation.	1	2	3

Additional comments_____
Members of the committee _____

M4. Thesis Defense – written (refer to M3 for measure rubric)

Geography and Environmental Studies, Sustainable Development, minor Measures

M1. Capstone Presentation
University of Colorado Colorado Springs Sustainable Development Minor
Assessment Rubric for Student Learning Outcomes

Component	4 Exceeds Expectations	3 Meets Expectations	2 Minimally Competent	1 Not Competent	N/A
PSLO1: Describe the interdependence of sustainable development's three pillars of social equity, environment, and economy.	Demonstrates a deep understanding of the interdependent relationship between social equity, environmental protection, and economy development,	Demonstrates an understanding of the interdependent relationship between social equity, environmental protection, and economy development, and can	Demonstrates a partial understanding of the interdependent relationship between social equity, environmental protection, and economy development.	Does not demonstrates an understanding of the interdependent relationship between social equity, environmental protection, and economy development	

	and can clearly articulate multiple connections among these.	articulate at least two of these connections.	Can articulate one or less of these connections.	and/or is unable to articulate these connections.	
PSLO2: Provide existing examples of environmental degradation, economic failure, and social inequity that motivates these interrelated concerns.	Clearly communicates multiple examples that explain why sustainability concerns itself with the three pillars listed in PSLO1.	Clearly communicates at least two examples that explain why sustainability concerns itself with the three pillars listed in PSLO1.	Clearly or partially communicates one example that explains why sustainability concerns itself with the three pillars listed in PSLO1.	Unable to communicate or generate any examples that explain why sustainability concerns itself with the three pillars listed in PSLO1.	
PSLO3: Provide plausible explanations for the cause of these problems, their interdependency, and reasonable ideas for their resolution	Clearly conveys possible explanations for environmental degradation, social injustice, and economic failures that undermine sustainability, and also demonstrates an ability to propose realistic solutions for at least some of these problems.	Clearly conveys possible explanations for environmental degradation, social injustice, or economic failures that undermine sustainability, and also demonstrates an ability to propose realistic solutions for at least one of these problems.	Partially conveys possible explanations for environmental degradation, social injustice, and/or economic failures that undermine sustainability, and/or struggles to demonstrate an ability to propose realistic solutions for any of these problems.	Unable to convey possible explanations for environmental degradation, social injustice, and/or economic failures that undermine sustainability.	

PSLO4: Critically understand the current state of knowledge regarding climate change, accurately depict where uncertainty exists with respect to climate change, and identify examples of social (i.e. social equity), economic, and environmental impacts resulting from climate change, such as disruptions to water supplies, water shortages, climate justice, food systems, etc	Demonstrates a thorough understanding of current climate change science and policy, including the role and location of uncertainty. Also able to provide multiple relevant examples of sustainability-related impacts caused by changes to the climate system.	Demonstrates an understanding of current climate change science and policy, including the role and location of uncertainty. Also able to provide one or two relevant examples of sustainability-related impacts caused by changes to the climate system.	Demonstrates a partial understanding of current climate change science and policy, including the role and location of uncertainty. Also able to provide one or no relevant examples of sustainability-related impacts caused by changes to the climate system.	Does not demonstrate an understanding of current climate change science and policy, including the role and location of uncertainty.	

Component	4 Exceeds Expectations	3 Meets Expectations	2 Minimally Competent	1 Not Competent	N/A
Teaching Goal 1: Sustainability and Career Preparation The minor prepares students for careers in fields relating to sustainability, including the private sector, non-profit organizations, and local, state, or federal agencies. Students graduating with the minor are also well positioned to pursue careers in education, and in conjunction with their majors to turn to graduate	Demonstrates readiness for a variety of sustainability-related careers, and articulates a clear understanding of which career paths might be realistic and appropriate as a recent graduate.	Demonstrates readiness for a variety of sustainability-related careers, and articulates some understanding of which career paths might be realistic and appropriate as a recent graduate.	Demonstrates readiness for a limited range of sustainability-related careers, and may or may not articulate an understanding of which career paths are realistic and appropriate as a recent graduate.	Does not demonstrate readiness for sustainability-related careers.	

studies in fields such as landscape architecture, environmental design, geography, political science, sociology, business, engineering, and natural and physical sciences.					
Teaching Goal 2: Group Collaboration Students will learn to work effectively in small groups that contribute to the successful completion of a full-class project.	Demonstrates a clear ability to work productively in a variety of small teams that contribute to the success of the full class.	Demonstrates some ability to work in small teams that contribute to the success of the full class.	Demonstrates difficulty working productively in small teams that contribute to the success of the full class.	Demonstrates an inability to work in small teams that contribute to the success of the full class.	

M2. Exit Exam

M3. Capstone Project: self-evaluation
GES 4800: Group Project Self- and Peer-Evaluation
Your Name _____   Date _____

1. Briefly describe which responsibilities you personally undertook as part of this group project:

2. How well do you feel you followed through on these tasks? (grade A-F, with brief justification)

3. Which part of the project do you feel worked best? Why?

4. Which part of the project posed the most difficulties? How did you try to address these?

5. Provide a brief assessment of the role each of your fellow team members played in completing this group project. Please provide both a narrative description and a grade, as in #2 above.

1st Team Member Name: *Grade: _____*

2nd Team Member Name: *Grade: _____*

3rd Team Member Name: *Grade: _____*

4th Team Member Name: *Grade: _____*

5th Team Member Name: *Grade: _____*

6th Team Member Name: *Grade: _____*

7th Team Member Name: *Grade: _____*

8^{t} Team Member Name: *Grade: _____*

9th Team Member Name: *Grade: _____*

10th Team Member Name: *Grade: _____*

6. If you wish to highlight any *individuals* who stood out for their contributions to the class project – either positively or negatively – feel free to do so here:

8. As the course turned out this semester, how many credits do you think it should have been worth?

9. Do you have any ideas for the focal project for next spring's Sustainability Seminar class? If so, I'd welcome your suggestions.

10. Other comments, questions, or concerns about this course?

M4. Capstone Project: peer evaluation (Refer to M3)

M5. Reflective Paper

Final Reflection Paper Assignment – GES 4800: Sustainability Seminar

The goal of this final paper is to have you reflect upon your experiences in this course and the effectiveness of individual and group projects in enhancing your understanding of sustainability. Throughout the semester we have approached sustainability from a number of perspectives, including our reading *No Impact Man*, committing to our own "personal impact projects," additional readings and discussions focused upon environmental ethics, environmental justice, economics of "plenitude," and global warming, and collaborating on an extended group project. Here's the key set of questions I'd like you to address:
In what ways have the readings and activities in this course influenced your understanding of the principal challenges and opportunities presented by sustainable development, and what do you see as your role in this field?

Aim for 1000-1250 words to handle these issues sufficiently.

Applied Mathematics, MSc

Measures
M1. MATH 5320, MATH 4310
M2. MATH 5130
M3. Oral Presentation
M4. Exit Survey

Mathematics, BA
Measures
M1. MATH 4480– Mathematical Modeling; Technique/Rigor, Concept
Understanding/Mathematical Writing
M2. MATH 4850 – Stochastic Modeling; Technique/Rigor, Concept
Understanding/Mathematical Writing
M3. Senior Exit Survey
M4. MATH 4310 – Modern Analysis 1; Technique/Rigor, Concept Understanding/Mathematical
Writing

Physics, BS Measures

Measures
M1. Senior Seminar Oral Presentation

PES 4810   Senior Seminar   Spring 2016

Oral Presentation Grading Rubric

Presenter: _____   Date: _____

Time used for presentation: _____   Time allowed: _____

(note: PSLO refers to the Program Student Learning Outcomes in the department Assurance of
Student Learning Plan.)
Preparation and Content: (PSLO1, 3 and 4)

	Not Acceptable (0-1)	Sufficient (2-3)	Outstanding (4-5)	SCORE
Topic: Chooses and narrows topic appropriately	Topic is poorly chosen and/or too broad or too narrow.	Topic is appropriate and can be covered adequately.	Excellent choice of topic for content and breadth.	
Thesis: Clearly communicates main idea	Main idea is not well communicated.	Main idea is adequately communicated.	Main idea is very clearly communicated.	
Support: Clearly provides supporting evidence	Minimal supporting evidence is	Adequate supporting	Excellent inclusion and	

	provided.	evidence is provided.	integration of supporting evidence.	
Organization: Well organized with clear pattern	Poorly organized and difficult to follow.	Organized but with a few areas where hard to follow.	Well organized with a clear pattern to follow.	
Motivation: Was topic well motivated?	Minimal motivation provided.	Topic was partially motivated.	Topic was clearly and well motivated.	
Physics content: Physics content is accurate.	Significant errors in physics content.	Minor errors in physics content.	Correct physics content.	
Summary: Key ideas clearly summarized?	Minimal summary at end of talk.	Summary provided but not complete.	Clear and complete summary of key ideas provided.	
Visual Aids: Appropriate information to support presentation.	Poor content in visual aids (graphs, pictures, charts, etc.)	Satisfactory content in visual aids to support presentation.	Excellent content of visual aids to support presentation.	
Completeness: Topic is covered thoroughly in the allowed time.	Presentation is poorly timed and/or fails to cover necessary content.	Topic is adequately covered in approximately the allowed time.	Topic is thoroughly covered in the allowed time.	

Presentation: (PSLO4)

	Not acceptable (0-1)	Sufficient (2-3)	Outstanding (4-5)	SCORE
Language: Appropriate for audience (jargon, terminology …)	Choice of language is not appropriate for audience.	Generally good choice of words for audience.	Excellent use of language for audience.	
Voice: varies rate, pitch, volume appropriately,	Minimal vocal variation.	Appropriate variation of vocal rate, pitch and volume.	Excellent variation of vocal rate, pitch and volume.	
Physical behaviors: Uses appropriate physical behaviors (motion, gestures, eye contact …)	Minimal or excessive motion and/or poor eye contact.	Reasonable motion, gestures and eye contact.	Excellent use of motion, gestures, and eye contact.	
Visual Aids: Easy to read, cleanly presented, reinforce content.	Visual aids are difficult to read and/or understand.	Visual aids can reasonably be read and understood.	Visual aids are easy to understand and read.	
Length: Appropriate length of time.	Presentation is significantly too short or too long.	Presentation is somewhat too short or too long.	Presentation is accurately timed.	

Total Score _____ out of _____ (_____ %)

Overall rating: Not acceptable _____   Sufficient Understanding _____
         Outstanding _____
Comments:

M2. Exit Survey

Physics B.S. Assessment   Exit Survey

Correlation to Program Student Learning Outcomes.
We are using the CU Boulder Colorado Learning Attitudes About Science (CLASS) survey as an
exit survey to assess how closely our graduating students match qualities associated with expert
physicists. This instrument has been validated through CU Boulder and used nationally.

The CLASS survey analysis provides scores in several categories which we correlate here to the
departmental Program Student Learning Outcomes

CLASS Category	PSLO #
Overall	
Personal Interest	
Real World Connections	1
Problem Solving – General	1, 3
Problem Solving – Confidence	1, 3
Problem Solving – Sophistication	1, 3
Sense Making – Effort	2
Conceptual Understanding	1, 2
Applied Conceptual Understanding	1, 2

Physics, MSc

Measures
M1. Thesis – oral presentation, none available
M2. Thesis – written, none available