# ASSESSMENT REPORT

## Organismal Biology

The Organismal Biology major has four F01mal Options: Ecology, Evolution and Behavior (ECEB), Conservation and Biodiversity (CONS), Integrative Biology (IBIO), and Integrative Biology Pre-Veterinary (IBIO-PVET). The Formal Options have similar curricula for the first two years, but these diverge in required courses (and especially in elective courses) for the Junior year and most greatly for the Senior year.

Numbers of students in these Formal Options vary. In June 2018, there were 26 ECEB, 53 CONS, 27 IBIO, and 48 IBIO-PVET students.

Note on 2017-2018 Assessment Rep01t Structure: As will become evident, our department is revising its curricula. This includes creating an expanded set of SLOs for which new assessment measures are being discussed and designed. For the 2017-2018 report, we decided to present data obtained from our established procedures using our old SLOs, but in the section "Purposeful Reflection and Action Plan" we also describe efforts to date to design and implement new SLOs. These new SLOs are listed below as well as in the "Purposeful Reflection and Action Plan" section to aid Assessment Repo1t evaluators in applying the Assessment Report Rubric to this rep01t.

**Specificity of Outcomes**

**Old outcomes**
Below are two broad Student Learning Outcomes (SLOs) that the faculty agree are crucial for students in the Organismal Biology major:

SLO 1. Students will be able to read, understand, and critically review scientific papers in the field of Organismal Biology. They will also be able to effectively locate, evaluate, and summarize information relevant to a topic in Organismal Biology.

SLO 2. Students will be able to communicate effectively in the oral and written gemes common to the discipline of Organismal Biology. Components of communication effectiveness include logical organization of ideas, appropriate language use and delivery, and (for oral communication) the student's ability to respond accurately to questions.

**New outcomes**
Our department has developed seven Department-Wide Student Learning Outcomes (SLOs) that apply to all of our majors. We also have one specific SLO that was developed for students in the Organismal Biology major. These SLOs are listed below.

**New Department-Wide SLOs**

SLO 1: Students will be able to critically review scientific articles in the life sciences. They will be able to recognize the tested hypothesis (or hypotheses) and identify the strengths, weaknesses, and major intellectual contributions of the aiticles.

SLO 2: Students will be able to effectively locate, evaluate, and summarize published information in the life sciences. They will be able to identify appropriate sources for specific information needs and use appropriate search tools and search strategies to access needed information.

SLO 3: Students will be able to communicate effectively to the appropriate audience in the oral genre common to biological sciences (e.g., a fmmal, oral digital presentation). Components of oral communication effectiveness include logical organization of ideas, appropriate language use and delivery, and the student's ability to respond accurately to questions.

SLO 4: Students will be able to communicate effectively to the appropriate audience in the written genres common to biological sciences (e.g., lab reports, research articles). Components of written communication effectiveness include logical organization of data and ideas, appropriate language use, and correct use of scientific citations.

SLO 5: Students will be able to apply the scientific method to fmmulate testable hypotheses, gather data that address the hypotheses, and analyze the data (statistically, graphically) to assess the degree to which their scientific work tests their hypotheses and draw appropriate conclusions from the data.

SLO 6: Students will develop metacognitive skills and be able to distinguish between broad categories of metacognition as applied to their major. In particular, they will distinguish between foundational (i.e., knowledge recall) and higher order (i.e., creative, analysis, synthesis) metacognitive skills.

SLO 7: Students will be able to use biological evidence in a comparative framework to explain how the themy of evolution offers a comprehensive scientific explanation for the unity and diversity of life on Earth. They will be able to use specific examples to demonstrate how evolution has shaped organismal morphology, physiology, life histmy, and behavior.

**New Major-Specific SLO**

**SLO 8 Organismal Biology:** Students will apply broad knowledge of the structure, function, and diversity of organisms to illustrate how ecological and evolutiomuy processes have shaped organisms at the individual, population, community, and ecosystem levels. Students will have skills related to behavior, physiology, biodiversity, systematics, evolution, ecology, and/or conservation research.

## Comprehensive Outcomes

The old outcomes were not comprehensive.
The new SLOs are agreed upon by our faculty to be comprehensive and so are an impmiant improvement to our assessment process.

## Communicating Outcomes

Faculty in our program agree the two old outcomes are crucial. The old outcomes are included (and expanded upon) in our set of new comprehensive SLOs presented above. Students in our capstone BIOL 4950 course (Senior Seminar) are informed of the two old outcomes listed above, and those outcomes are evaluated in that course.

In the Spring of 2018, the Office of Assessment hosted a Student Focus session for our Organismal Biology majors. As pmi of this session, students were shown our new SLOs and asked to comment on them. Students in general felt that the new SLOs were an impo1iant list of skills, and had some suggestions about course offerings and course contents.

Our new SLOs are also going to be introduced to students in our new Sophomore-level required course: Professional Development (BIOL 2100). One of the goals of that course is to acquaint students with their cmTiculum, its SLOs, and oppo1tunities for them to receive research mentoring from faculty/staff.

## Curriculum M ap

Old Organismal Biology Curriculum Map. The two student learning outcomes are mapped to the main BIOL courses that are shared by the four Formal Options in this major.

| Course (listed in order in Curriculum Model) | SLO 1 (read, understand, review papers) | SLO2 (communicate effectively) |
|---|---|---|
| BIOL 1020/1021 Principles of Biology | | |
| BIOL 1030/1031 Organismal Biology | | |
| BIOL 3000 Genetics | | |
| BIOL 3060 Ecology | | X |
| BIOL 3030 Evolution and Systematics | | |
| BIOL 4100 Cell Biology | | |
| BIOL 4950 Senior Seminar | X | X |

New Organismal Biology Curriculum Map. An updated cuniculum map for the Organismal Biology major (below) was developed and approved by the faculty during Fall Semester 2017. The map lists all the required courses for students in this major. It is aspirational, in that we need to determine the extent to which the check-marks represent the coverage of each SLO in each listed course. In addition, we hope to improve the map during our August 2018 retreat by replacing the check-marks with information regarding the extent to which each SLO is addressed in each course (e.g., introduced , reinforced, mastered). The faculty agree that the map provides a plan for coverage of the SLOs in courses that are required for students in this major.

| Course | SLO 1: Critically review articles | SLO 2: Evaluate sources | SLO 3: Oral communication | SLO 4: Written communication | SLO 5: Formulate stable hypotheses | SLO 6: Metacognition | SLO 7: Theory of evolution | Organismal SLO 8: Organism form and function |
|---|---|---|---|---|---|---|---|---|
| BIOL 1020 | | | | | | II | II | II |
| BIOL 1021 | II | | II | | II | II | II | II |
| BIOL 1030 | | | | | | II | II | II |
| BIOL 1031 | II | | II | | II | II | II | II |
| BIOL 2100 | II | II | II | II | | II | | |
| BIOL 3000 | | | | | | II | II | II |
| BIOL 3001 | II | | | II | II | II | II | II |
| BIOL 3030 | II | | | | | II | II | II |
| BIOL 3060 | | II | | II | II | II | II | II |
| BIOL 4100 | | | | | | II | II | II |
| BIOL 4950 | II | II | II | II | | II | II | II |

## Measurement

Because they have only been recently approved by the DBS faculty, we have not designed measures for all of our new SLOs nor begun to collect data on them. Thus, the measures and results provided in this rep01t are in the context of the old SLOs.

### Outcome-Measure Alignment

**SLO 1. Students will be able to read, understand, and critically review scientific papers in the field of Organismal Biology. They will also be able to effectively locate, evaluate, and summarize information relevant to a topic in Organismal Biology.**

Measures:

a) All students in this major complete the capstone course BIOL 4950: Senior Seminar. In this course, students research and prepare an Annotated Bibliography on a particular research topic in the field of Organismal Biology. Their capacity to complete this assignment effectively measures their ability to locate,

evaluate, and summarize information relevant to a topic in Organismal Biology. The annotated bibliography generated by each student is assessed using a standardized rubric (see Appendix for rubrics).

b) All students in this major complete BIOL 4950: Senior Seminar. In this course, students read, understand, and write synopses of several original research articles in the field of Organismal Biology. The synopses are due at different times during the semester so that a time period is available to evaluate student improvement. All student synopses submitted for BIOL 4950 are assessed using a standardized rubric (see Appendix for rubrics).

c) The Office of Institutional Research (OIRA) perfo1ms an exit survey for graduating seniors. One section of this survey covers the University's General Education outcomes. Three of these outcomes (listed below) include abilities pertinent to SLO 1. Students rate their ability at graduation, using the scale of Advanced, Intermediate, Basic, or Little/None.

General Education outcomes paiticularly pertinent to SLO 1 for DBS majors
Outcome 1: Locate, evaluate and use information sources
Outcome 2: Read analytically and critically
Outcome 8: Use writing to communicate effectively for a variety of audiences and purposes

**SLO 2. Students will be able to communicate effectively in the oral and written genres common to the discipline of Organismal Biology. Components of communication effectiveness include logical organization of ideas, appropriate language use and delivery, and (for oral communication) the student's ability to respond accurately to questions.**

Measures:
a) All students in the program complete the capstone course BIOL 4950, Senior Seminar. One purpose of BIOL 4950 is to provide experience in the professional written and oral communication gemes used in Organismal Biology. Each student presents a summary of a published scientific paper, using PowerPoint, in a format typical of that used at professional scientific meetings. A rubric common to all BIOL 4950 sections is used by the instructor(s) to assess each student's presentation (see Appendix for rubrics). The rubric contains sections designed to obtain a direct measure of each of the major components of this SLO, i.e., language use and delivery, organization and preparation, content, visual media, and Q&A/moderator ability.

b) The Office of Institutional Research (OIRA) performs an exit survey for graduating seniors. One section of this survey covers the University's General Education outcomes. One of these outcomes (listed below) includes abilities pertinent to SLO 2. Students rate their ability at graduation, using the scale of Advanced, Intermediate, Basic, or Little/None.

General Education outcome particularly pertinent to SLO 2 for DBS majors
Outcome 9: Make an effective oral presentation

**Direct Measures**
All measures derived from the BIOL 4950 course are direct measures. The only indirect measure we use is the data obtained from the graduation survey.

**Data Collection**
Data were collected for the instructors from the Organismal Biology sections of BIOL 4950 in Fall 2017 and Spring 2018 (the course is not offered in Summer semesters). The Fall course was taught by a team of three instructors and hence had the benefit of having multiple faculty discuss application of the rubrics to student performance. Two of the three were new to the course, and the third member had only taught the course once,

so the entire team was relatively inexperienced. The Spring course was taught by a single instructor experienced in BIOL 4950.

Because there were too many Organismal Biology majors for one section of BIOL 4950 each semester, some students in each semester were placed into the BIOL 4950 sections that were mainly made up of students from other DBS majors. Since the same rubrics were used, the data were integrated with those from the Organismal Biology section summaries. We acknowledge that instructors may vary in their application of the rubric to student performances in their section of the course.

We believe that students are motivated to perform at a high level in this capstone course because their course grade is based upon their activities in the class. Most of their grade stems from the Oral Presentation (approx. 40%), with lesser amounts from the Synopses (about 25% for all 3 synopses together) and Annotated Bibliography (about 20%). Note that there may be slightly different weighting of these assignments in paiiicular versions of this course (hence " about" in the previous percentages).

Data from the Graduating Senior Exit Survey were supplied in June 2018 by the AU Office of Research and Institutional Analysis (ORIA). ORIA summarized results obtained from students graduating during Summer 2017, Fall 2017, and Spring 2018, and these are included in the results below.

# Results

**SLO 1: Students will be able to read, understand, and critically review scientific papers in the field of Organismal Biology. They will also be able to effectively locate, evaluate, and summarize information relevant to a topic in Organismal  Biology.**

Measures:
a) All students in this major complete BIOL 4950: Senior Seminar. In this course, students research and prepare an Annotated Bibliography on a paiiicular research topic in the field of Organismal Biology. Their ability to complete this assignment effectively measures their ability to locate , evaluate, and summarize information relevant to a topic in Organismal Biology.

Results: Data in the table below suggest good results. Of 31 students, at most only 5 scored below "Meets Standard" and the majority of students scored in the "Exceeds Standard" category for all but two Evaluation Categories. Those categories, "Annotations" and " Mechanics," should be targeted for attention in future courses as paiiicularly needing improvement in student scores.

### Annotated Bibliography BIOL 4950 Organismal Biology

Number of students who scored in each level of performance for each of the categories listed in the left column.

| Evaluation Category | Exceeds Standard | Meets Standard | Nearly Meets Standard | Does Not Meet Standard |
|---|---|---|---|---|
| **Introduction** | 16 | 13 | 3 | 0 |
| **Annotations** | 9 | 20 | 5 | 0 |
| **Mechanics** | 11 | 17 | 4 | 0 |
| **Bibliography** | 19 | 11 | 2 | 0 |
| **Citations** | 15 | 14 | 2 | 0 |

b) All students in this major complete BIOL 4950: Senior Seminar.
In this course, students read, understand, and write synopses of several original research articles in the field of Organismal Biology. Students write synopses for three aiiicles during the semester.

Results: Data from three synopses are presented below. Generally, students did well, and some improvement in scores was evident over time. One problematic area was the "Identification of Hypothesis" section, as with the third synopsis a couple student scores still remained in the "Does not meet standard" category. Faculty would also like to see fewer students scoring below the "Meets standard" category for all the assessed components by the time students reach the third synopsis. They recognize, however, that other contributing factors may be involved, such as "assignment fatigue," the fact that an individual synopsis is w01ih relatively few points, and the fact that the third synopsis is due late in the semester (when student workload may be relatively heavy). These other contributing factors may cause students who are capable of higher-level performance to produce work that is less than their best effort.

### Synopses (BIOL 4950): Organismal Biology

Note: Scores for the three Synopses, combining data from both Fall 2017 and Spring 2018, are presented here.

Synopsis 1 (first) BIOL 4950
Number of students who scored in each level of perfo1mance for each of the categories listed in the left column.

| Evaluation Category | Exceeds Standard | Meets Standard | Nearly Meets Standard | Does Not Meet Standard |
|---|---|---|---|---|
| Identification of Hypothesis | 6 | 11 | 7 | 7 |
| Description of Research Findings | 4 | 14 | 13 | 0 |
| Summary | 5 | 14 | 12 | 0 |
| Usage | 7 | 18 | 6 | 0 |
| Mechanics | 8 | 18 | 5 | 0 |
| Citations | 7 | 18 | 6 | 0 |

Synopsis 2 BIOL 4950
Number of students who scored in each level of performance for each of the categories listed in the left column.

| Evaluation Category | Exceeds Standard | Meets Standard | Nearly Meets Standard | Does Not Meet Standard |
|---|---|---|---|---|
| Identification of Hypothesis | 14 | 14 | 3 | 1 |
| Description of Research Findings | 11 | 18 | 3 | 0 |
| Summary | 9 | 14 | 9 | 0 |
| Usage | 9 | 18 | 5 | 1 |
| Mechanics | 13 | 16 | 3 | 0 |
| Citations | 13 | 13 | 6 | 0 |

Synopsis 3 (last) BIOL 4950

Number of students who scored in each level of performance for each of the categories listed in the left column.

| Evaluation Category | Exceeds Standard | Meets Standard | Nearly Meets Standard | Does Not Meet Standard |
|---|---|---|---|---|
| Identification of Hypothesis | 14 | 13 | 2 | 2 |
| Description of Research Findings | 14 | 13 | 4 | 0 |
| Summary | 15 | 12 | 4 | 0 |
| Usage | 15 | 13 | 3 | 0 |
| Mechanics | 15 | 15 | 1 | 0 |
| Citations | 17 | 9 | 5 | 0 |

c) Results of the OIRA Graduating Senior Exit Survey for the three General Education abilities pertinent to SLO 1 are presented in the table below. Students rate their ability at graduation, using the scale of Advanced, Intermediate, Basic, or Little/None.

Most students rated their ability as Advanced, but significant portions of them reported lower levels of ability (mostly Inte1mediate). Our faculty would like to see more of our students reporting higher levels of these skills, but are glad to see <10% of students reported Basic ability upon graduation.

Results: Below are the responses of 27 students, showing the percentage of respondents that rated their ability for each of the General Education outcomes.

| General Education Outcomes | Advanced ability | Intermediate ability | Basic ability | Little or no ability |
|---|---|---|---|---|
| Outcome 1: Locate, evaluate and use information sources | 78% | 15% | 7% | 0% |
| Outcome 2: Read analytically and critically | 69% | 27% | 4% | 0% |
| Outcome 8: Use writing to communicate effectively for a variety of audiences and purposes | 62% | 35% | 4% | 0% |

SLO 2. Students will be able to communicate effectively in the oral and written genres common to the discipline of Organismal Biology. Components of communication effectiveness include logical organization of ideas, appropriate language use and delivery, and (for oral communication) the student's ability to respond accurately to questions.

Measures: One purpose of BIOL 4950 is to provide experience in the professional written and oral communication gemes used in Organismal Biology. Each student presents a scientific paper using PowerPoint in a format typical of that used at professional scientific meetings.

Results: Data from 33 majors in the two semesters are presented in the table below. Scores were generally high (with at least 16 students in the "Exceeds Standard" category), indicating they have effective professional communication skills, but there is room for improvement in all the skills. Some students scored below "Meets Standard" for all of the four major skills measured by the rubric. We noted that that Fall 2017 course instructors did not rate any students in the "Exceeds Standard" categ01y, in marked contrast to the Spring 2018 instructor (most of whose students were in that category for most skills). We expect the major reason for this disparity is that two of the three faculty in the Fall 2017 team were new to the course, while the third member had only taught the course once before. One way to address this issue is to develop a set of materials that can be used to calibrate faculty expectations so that ratings are more consistent across sections.

BIOL 4950 Oral Presentation data for majors in Organismal Biology

Number of students who scored in each level ofperf01mance for each of the rubric skill categories listed in the left column.

| BIOL 4950 rubric skill | Advanced (Exceeds Standard) | Intermediate (Meets Standard) | Basic (Nearly meets standard) | Little/None (Does not Meet standard) |
| --- | --- | --- | --- | --- |
| **Organization and Preparation** The student exhibits logical organization | 16 | 14 | 3 | 0 |
| **Content** The student understands and explains the methodologies and findings of the paper effectively | 16 | 13 | 4 | 0 |
| **Language Use and Delivery** The student communicates ideas effectively | 17 | 15 | 1 | 0 |
| **Questions and Answers and Moderator Ability** The student provides understanding of concepts and effective moderation of group discussion | 26 | 15 | 2 | 0 |

b) Results of the OIRA Graduating Senior Exit Survey for the General Education ability pe1iinent to SLO 2 (Outcome 9: Make an effective oral presentation) are 41% Advanced, 52% Inte1mediate, 7% Basic, and 0% Little/None. The faculty would like to see the majority of students report Advanced skills, and we will be discussing how we can develop oral presentation skills in courses that students take before the capstone Senior Seminar (BIOL 4950) course as one way to address this issue.

Historical Trends

We have two of the same SLOs, and measures for their assessment, from three years (2015-16, 2016-17, and 2017-2018), so that we can now compare data across those three years to begin to examine temporal trends. Below we present data across time from the three main activities in BIOL 4950 (Oral Presentation, Bibliography, Final Synopsis). For the BIOL 4950 rubrics, mean student scores were calculated using a value of 3 for "Exceeds Standard," 2 for "Meets Standard," 1 for "Nearly Meets Standard," and O for "Does Not Meet Standard," and then using the number of students scoring in each category to calculate an overall mean score.

**Oral Presentation Skills:** Figure 1 (below) summarizes the data from the Oral Presentation Skills rubric. Scores were generally good (means >2, or "Meets Standards") but there was some variation in means between years.
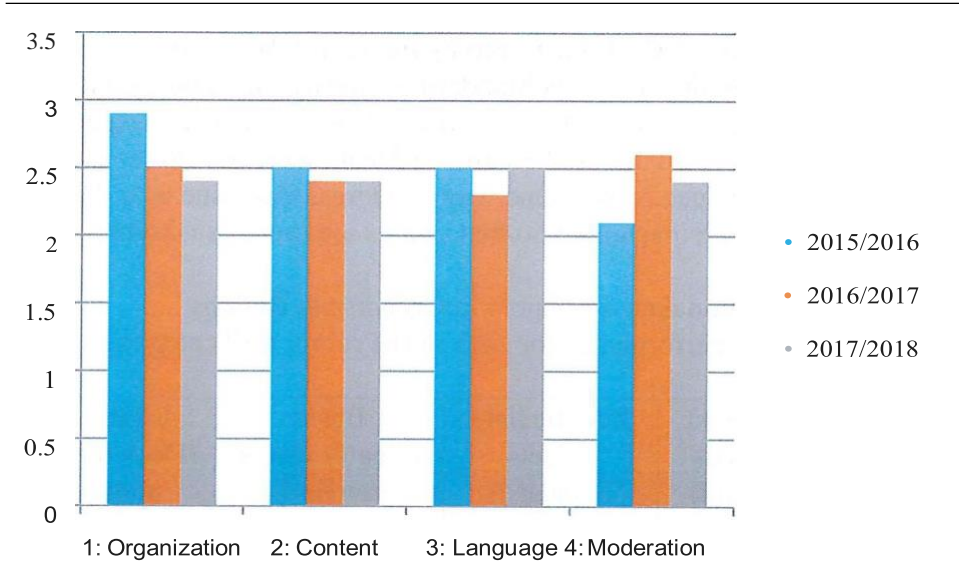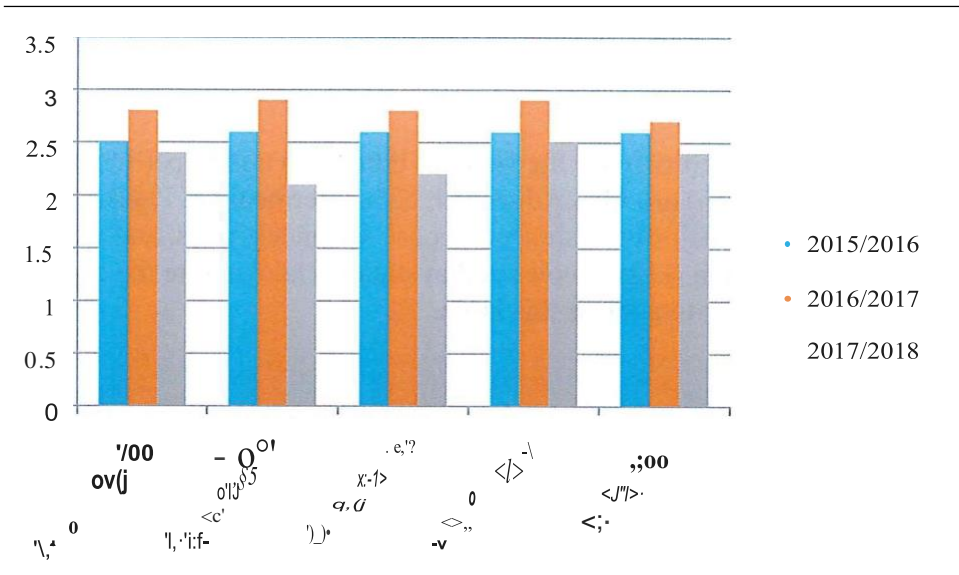


Figure 1. Mean student scores for each of the four main skills measured by the rubric for students in the 2015/2016, 2016/2017, and 2017/2018 coho1is. The maximum possible score (co1Tesponding to "Exceeds Standard") for each Rubric Skill is 3.0.

Bibliography Skills:

Data from the Bibliography Skills rubric are presented in Figure 2. While student scores were generally good (scores of 2 or better) from all cohmis, values were consistently lower for the 2017/2018 cohmi in all five areas. We suspect the major reason for this disparity is that two of the three faculty in the Fall 2017 team were new to the course, while the third member had only taught the course once before. Again, one way to address this issue is to develop a set of materials that can be used to calibrate faculty expectations so that ratings are more consistent across sections.
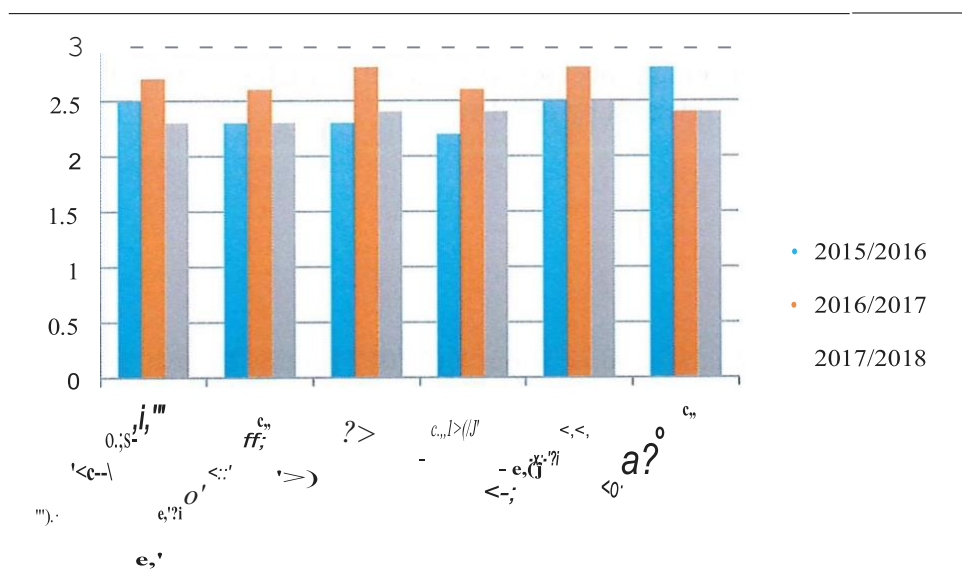


Figure 2. Mean student scores for each of the five main areas measured by the Bibliography rubric for students in the 2015/2016, 2016/2017, and 2017/2018 cohmis. The maximum possible score (corresponding to "Exceeds Standard") for each rubric area is 3.0.

Synopsis Skills:

The Synopsis Skills presented here (Fig. 3) are the data from the last synopsis prepared by students in the BIOL 4950 course. Using the last synopsis is considered an appropriate metric to evaluate a student's ability at the end of a course since it provides data that can be compared relatively consistently across student coh01is.

Student scores in Figure 3 were generally good (scores of 2 or better, signifying "Meets Standard") from all coh01is, with values from the 2016/2017 cohort generally highest. Paii of this trend might be due to relatively low scores from the Fall 2017 "new" team of faculty, but low scores for area 2 (Research Findings) and area 3 (Summaiy) were also rep01ied from the 2015/2016 cohort. We suspect that reasons for the variability in Figure 3 include the instructor experience issue reported earlier, plus the inherent variability among members of student coh01is.



Figure 3. Mean student scores for each of the six main areas measured by the Synopsis Rubric for students in the 2015/2016, 2016/2017, and 2017/2018 coh01is. The maximum possible score (conesponding to "Exceeds Standard") for each rubric area is 3.0.

Self-reported Student Skills:

We are unable to repo1i trend data for the Self-Reported Student Skills. This is because our past Assessment Rep01is included data from questions included in the Graduating Student Survey that were specific to our depaiiment. Staiiing with this year's repo1i, we are now using the University's Graduating Student Survey data that address University General Education outcomes. Since the questions are different, it is not feasible to combine them with data from our prior Assessment Rep01is to determine trends through time. Next year, however, we will have data from another cohort of students who are answering the same University General Education Outcome questions and thus we can then begin to track trends over time again.

**Interpreting Results**

Results from last year's 2016-2017 Program Repo1i were shared with the faculty at our August 2017 Depaiimental Retreat. This retreat focused on our undergraduate programs and was the springboard for development of our new SLOs and Cuniculum Map.

Results from this year's report show generally good student performance in the BIOL 4950 course. Students are displaying a good level of ability, and the faculty teaching those courses agree that our students ai·e capable. There are some areas for improvement, as were mentioned in the individual sections above. These will be targeted for increased attention by the instructors of future course sections. There were a couple larger-scale

issues identified in these results as well. In paiticular, the issue of standardizing faculty evaluations of student perfo1mance in the sections taught by different instructors or instructor teams needs to be addressed here and across our instances of BIOL 4950 in general. Another important suggestion is to discuss how to strengthen the student skills evaluated in BIOL 4950 by giving students opportunities to practice those skills in prior courses.

Finally, the self-reported student skills data are encouraging but leave room for improvement. An imp01tant suggestion for improvement is to give students more opportunities to practice the General Education outcomes in other BIOL courses. As described below under "Purposeful Reflection and Action Plan," our depaitment is discussing and designing changes that we hope will be reflected in increased scores in student self-evaluations of future years.

### Communicating Results

We have not communicated these results to the faculty yet, but will do so during our Faculty Retreat in August 2018. At this retreat we will discuss our SLOs, and how to improve our Assessment procedures, as well as discuss the strengths and weaknesses of our Program as revealed by our data.

# Use of Results

### Purposeful Reflection and Action Plan

Results from our 2016-2017 Assessment Report were a major topic in our Fall 2017 Faculty Retreat. Held in August 2017, this 1.5-day Biology Faculty Retreat featured two nationally-known expe1ts in biological sciences curriculum re-design: Ellen Goldey (Dean, Wilkes Honors College, Florida Atlantic University) and April Hill (Chair, Depaitment of Biology, University of Richmond). These leaders facilitated conversations about teaching and learning in the program, and we specifically discussed SLOs, High Impact Practices (HIPs), our 2016-2017 Assessment Rep01ts, and other cunicular issues.

Continuing work during Fall Semester 2017 led to our New SLOs and a New Cuniculum Map for this major. These ai·e presented at the end of this section. Our depaitment also has been accepted into the eP01tfolio Project Coh01t, and during Fall Semester 2017 was selected to participate in the Biggio/Assessment Learning Improvement Project focusing on SLO 6 (metacognition). During Spring Semester 2018 we finalized our definition of SLO 6, created a layered eP01ifolio Map to accompany our New Curriculum Map, met with Assessment Office personnel to re-align our New SLOs to our BIOL 4950 (capstone Senior Seminar) course as well as develop new assessment rubrics for that course, and created reflective questions for students taking our BIOL 4980 (Undergraduate Research) course that we plan to use to gather information that will help us assess several SLOs. The new BIOL 4950 assessment rubrics are presented in the Appendix of this repo1t: they are placed after the rubrics that we used with the Old SLOs in gathering data used in the rep01t for this year.

New SLOs:

Our department has developed seven Depaiiment-Wide Student Learning Outcomes (SLOs) that apply to all of our majors. We also have one specific SLO that was developed for students in the Organismal Biology major. These SLOs ai·e listed below.

Department-Wide SLOs

SLO 1: Students will be able to critically review scientific aiticles in the life sciences. They will be able to recognize the tested hypothesis (or hypotheses) and identify the strengths, weaknesses, and major intellectual contributions of the aiticles.

SLO 2: Students will be able to effectively locate, evaluate, and summarize published information in the life sciences. They will be able to identify appropriate sources for specific inf01mation needs and use appropriate search tools and search strategies to access needed info1mation.

SLO 3: Students will be able to communicate effectively to the appropriate audience in the oral genre common to biological sciences (e.g., a formal, oral digital presentation). Components of oral communication effectiveness include logical organization of ideas, appropriate language use and delivery, and the student's ability to respond accurately to questions.

SLO 4: Students will be able to communicate effectively to the appropriate audience in the written genres common to biological sciences (e.g., lab reports, research aiiicles). Components of written communication effectiveness include logical organization of data and ideas, appropriate language use, and conect use of scientific citations.

SLO 5: Students will be able to apply the scientific method to fo1mulate testable hypotheses, gather data that address the hypotheses, and analyze the data (statistically, graphically) to assess the degree to which their scientific work tests their hypotheses and draw appropriate conclusions from the data.

SLO 6: Students will develop metacognitive skills and be able to distinguish between broad categories of metacognition as applied to their major. In paiiicular, they will distinguish between foundational (i.e., knowledge recall) and higher order (i.e., creative, analysis, synthesis) metacognitive skills.

SLO 7: Students will be able to use biological evidence in a comparative framework to explain how the the01y of evolution offers a comprehensive scientific explanation for the unity and diversity of life on Eaiih. They will be able to use specific examples to demonstrate how evolution has shaped organismal morphology, physiology, life history, and behavior.

Major-Specific SLO

**SLO 8 Organismal Biology:** Students will apply broad knowledge of the structure, function, and diversity of organisms to illustrate how ecological and evolutionary processes have shaped organisms at the individual, population, community, and ecosystem levels. Students will have skills related to behavior, physiology, biodiversity, systematics, evolution, ecology, and/or conservation research.

**New Curriculum Map**

An updated_map for the Organismal Biology major (below) was developed and approved by the faculty dming Fall Semester 2017. The map lists all the required courses for students in this major. It is aspirational, in that we need to determine the extent to which the check-marks represent the coverage of each SLO in each listed course. The faculty agree that the map provides a plan for coverage of the SLOs in courses that are required for students in this major.

| Course | SLO 1: Critically review articles | SLO 2: Evaluate sou rce s | SLO 3: Oral communication | SLO 4: Written communication | SLO 5: For mulat e testable hypotheses | SLO 6: Metacognition | SLO 7: Theory of evolution | Organismal SLO 8: Organism form and function |
|---|---|---|---|---|---|---|---|---|
| BIOL 1020 | | | | | | V | V | V |
| BIOL 1021 | V | | V | | V | V | V | V |
| BIOL 1030 | | | | | | V | V | V |
| BIOL 1031 | V | | V | | V | V | V | V |
| BIOL 2100 | V | V | V | V | | V | | |
| BIOL 3000 | | | | | | V | V | V |
| BIOL 3001 | V | | | V | V | V | V | V |
| BIOL 3030 | V | | | | | V | V | V |
| BIOL 3060 | | V | | V | V | V | V | V |
| BIOL 4100 | | | | | | V | V | V |
| BIOL 4950 | V | V | V | V | | V | V | V |

# APPENDIX: OLD BIOL 4950 RUBRICS

(used for assessment reports for 2015-2016, 2016-2017, and 2017-2018)

Annotated Bibliography Rubric (15% of grade) BIOL 4950 Senior Seminar

| Evaluation Category | Exceeds Standard | Meets Standard | Nearly Meets Standard | Does Not Meet Standard |
|---|---|---|---|---|
| **Introduction** | Description of the area of research clear and concise | Description of the area of research clear | Description of area of research unclear or verbose | Little or no description of area of research |
| **Annotations** | Annotation includes article's relevance to subject area, hypothesis, and major conclusions<br><br>Annotation presented in clear and concise manner | Annotation lacks article's relevance to subject area, but includes hypothesis and major conclusions<br><br>Annotation presented in clear manner | Annotation includes article's relevance to subject area and major conclusions<br><br><br>Annotation presented in clear manner, but verbose | Annotation incomplete and lacks 2 or more of the following: relevance to subject area, hypothesis and/or major conclusions<br><br>Annotation presented in unclear manner and verbose |
| **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. |
| **Bibliography** | At least 10 references included. No more than 1 review article or 1 non-refereed article (webpage) included. | At least 10 references included. Two or more review articles or non-refereed articles (webpage) included. | Five to 10 references included, or included several non-refereed (webpage) articles. | Less than 5 references included. |
| **Citations** | All references in the correct format with no errors. | Most references in the correct format. | Few references in the correct format. Inconsistencies evident. | Absent of correct format. |

**Synopsis Rubric (3 per semester: 20% of grade)**
**BIOL 4950 Senior Seminar**

| Evaluation Category | Exceeds Standard | Meets Standard | Nearly Meets Standard | Standard Not Met |
|---|---|---|---|---|
| **Identification of Hypothesis** | Clear and concise statement of paper's hypothesis in a single sentence. | States paper's hypothesis. | Partial statement of paper's hypothesis, or hypothesis statement contains some errors. | No statement of paper's hypothesis, or statement contains numerous errors. |
| **Description of Research Findings** | Clear description of the research, including methods and results. Clear & concise description of the contribution of results to the paper's overall conclusions. | Adequate description of the research, including methods and results. Reasonable description of the contribution of results to the paper's overall conclusions. | Limited description of research, including methods and results. One or more experiments not described / evidence of misunderstanding of contribution of results to the paper's overall conclusions. | Little or no attempt to describe methods and results. Little or no evidence of understanding of the contribution of results to the paper's overall conclusions. |
| **Summary** | Contribution of the work to the field concisely and clearly summarized. | Contribution of the work to the field summarized adequately. | Contribution of work to the field incompletely summarized, or with misunderstandings evident. | No summary of contribution of the work to the field. |
| **Usage** | No errors in sentence structure and word usage. Scientific terminology used correctly throughout. | Very few errors in sentence structure and word usage. Very few errors in scientific terminology. | Few errors in sentence structure and word usage. Few errors in scientific terminology. | Several distracting errors in sentence structure and word usage. Little to no use of terminology. |
| **Mechanics** | No errors in punctuation, capitalization, and/or spelling. | Almost no errors in punctuation, capitalization, and/or spelling. | Many errors in punctuation, capitalization, and/or spelling. | Several distracting errors in punctuation, capitalization, and/or spelling. |
| **Citations** | Article cited in the correct format with no errors. | Article cited in the correct format with very few errors. | Article cited in the wrong format or citation contains numerous errors. | No citation provided. |

Oral Presentation/Moderator Rubric (40% of grade)          BIOL 4950: Senior Seminar


**Student Name:** _____          **Date:** _____


| | Exceeds Standard | Meets Standard | Nearly Meets Standard | Does Not Meet Standard |
|---|---|---|---|---|
| **Language Use and Delivery** The student communicates ideas effectively | q Effectively uses eye contact. q Speaks clearly, effectively and confidently using suitable volume and pace. q Fully engages the audience. q Dresses appropriately. q Selects suitable technical and varied words for context, and uses correct grammar. | q Maintains regular eye contact. q Speaks clearly and uses suitable volume and pace. q Takes steps to engage the audience. q Dresses appropriately. q Selects words appropriate for context, and uses correct grammar. | q Some eye contact, but not maintained. q Speaks clearly and unclearly at different times. q Occasionally engages audience. q Dresses inappropriately. q Selects words inappropriate for context; uses incorrect grammar. | q Uses minimal eye contact. q Fails to speak clearly and audibly and uses varying pace. q Does not engage audience. q Dresses inappropriately. q Selects words inappropriate for context; uses incorrect grammar. |
| **Organization and Preparation** The student exhibits logical organization. | q Introduces topic clearly and creatively. q Maintains clear focus on topic. q Effectively includes smooth transitions to connect key points. q Ends with logical, effective, and relevant conclusion. q Ends on time (30-35 min) | q Introduces topic clearly. q Maintains focus on topic. q Include transitions to connect key points. q Ends with coherent conclusion based on evidence. q Talk ends close to time | q Introduces topic. q Somewhat maintains focus on topic. q Includes some transitions to connect key points. q Ends with a conclusion based on evidence. q Talk somewhat overtime | q No introduction of topic. q Does not establish or maintain focus on topic. q Uses ineffective transitions that rarely connect points. q Ends without a conclusion. q Talk way overtime or too short (<15 minutes) |
| **Content** The student understands and explains the methodologies and findings of the paper effectively | q Clearly defines research question addressed in paper and its significance. q Provides sufficient context for audience with sufficient understanding of the research and its importance. q Clearly explains each of the experiments, including methods, results and statistics. q Clearly synthesizes results and their contribution to the paper's overall conclusions. q Provides a clear summary of the work and creative suggestions for future questions and work. | q Clearly defines research question addressed in paper and the its significance. q Provides some context for the research. q Clearly explains most of the methods, results and statistics. May have some difficulty with 1 or more aspects of paper. q Clearly synthesizes results and their contribution to the paper's overall conclusions.. q Provides a clear summary of the work but has few if any suggestions for future work. | q Defines research question addressed in paper but is uncertain of its significance. q Provides some context for the research. q Explains most of the experiments, including methods, results and statistics. May have some difficulty with 1 or more aspect of paper. q Attempts to synthesize results and their contribution to the paper's overall conclusions. q Provides a summary of the work | q Does not define research question addressed in paper. q Provides little or no context for the research. q Is unable to explain many of the experiments, including methods, results and statistics or omits some aspects of paper. q Little or no attempt to synthesize results and their contribution to the paper's overall conclusions. q Provides little or no summary of the work. |

| | | | |
|---|---|---|---|
| **Visual Media** The student uses slides to communicate information effectively | q☐Employs appropriate number of slides (~1 slide / minute). q☐Slides well labeled and easy to follow. q☐Figures on slides appropriately labeled (e.g., graph axes). q☐Slides consistently well explained. | q☐Employs appropriate number of slides (~1 slide / minute). q☐Slides are generally well labeled and easy to follow. q☐Figures on slides are appropriately labeled (e.g., graph axes). q☐Slides generally well explained. | q☐Too few or too many slides per minute. q☐Some slides too wordy or difficult to follow. q☐Some slides not labeled. q☐Some figures are missing or are not well labeled (e.g., graph axes). q☐Presenter does not explain all slides clearly or may read some of slides. | q☐There are too few or too many slides per minute. q☐Slides not in the correct order. q☐Slides too wordy. q☐Figures missing or are poorly labeled (e.g., graph axes). q☐Presenter unable to explain slides or simply reads the text from slide. |
| **Questions and Answers and Moderator Ability** The student provides understanding of concepts and effective moderation of group discussion | q☐Demonstrates extensive knowledge of topic by responding confidently, precisely, and appropriately to all audience questions and feedback. q☐Engages the group highly and leads discussion on many elements of the paper | q☐Demonstrates good knowledge of topic by responding accurately and appropriately to questions and feedback most of the time. q☐Engages the group reasonably well and facilitates discussion on several elements of the paper | q☐Demonstrates fair knowledge of topic by responding accurately and appropriately to questions and feedback some of the time. q☐Engages the group somewhat and moderates discussion on 1 or 2 elements of the paper | q☐Demonstrates poor knowledge of topic by responding inaccurately and inappropriately to questions and feedback. q☐Does not engage the group; relies on other students and/or faculty for discussion |

# NEW
# BIOL 4950
# RUBRICS
(to be used for assessment
report for 2018-2019)

# Annotated Bibliography Rubric BIOL 4950 Undergraduate Seminar (20% of grade)

Student Name: _____

| Evaluation Category | Exceeds Standard | Meets Standard | Nearly Meets Standard | Does Not Meet Standard |
|---|---|---|---|---|
| **Introduction – SLO 1 (recognize major intellectual contributions)** | Description of area of research clear and concise | Description of area of research clear | Description of area of research unclear or verbose | Little or no description of area of research |
| **Annotations – SLO 2 (evaluate and summarize)** | q☐Annotation includes article's relevance to subject area, hypothesis, and major conclusions<br><br>q☐Annotation presented in clear and concise manner | q☐Annotation lacks article's relevance to subject area, but includes hypothesis and major conclusions<br><br>q☐Annotation presented in clear manner | q☐Annotation includes article's relevance to subject area and major conclusions<br><br>q☐Annotation presented in clear manner, but verbose | q☐Annotation incomplete and lacks 2 or more of the following: relevance to subject area, hypothesis and/or major conclusions<br><br>q☐Annotation presented in unclear manner and verbose |
| **Mechanics – SLO 4 (written communication)** | 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. |
| **Bibliography – SLO 2 (locate published information)** | q☐At least 10 references included.<br><br>q☐No more than 1 review article or 1 non-refereed article (webpage) included. | q☐At least 10 references included.<br><br>q☐Two or more review articles or non-refereed articles (webpage) included. | q☐Five to 10 references included, or included several non-refereed (webpage) articles. | q☐Less than 5 references included. |
| **Citations – SLO 4 (written communication)** | All references in the correct format with no errors. | Most references in the correct format. | Few references in the correct format. Inconsistencies evident. | Absence of correct format. |

**Synopsis Rubric (3 per semester, 25% of grade)**        **BIOL 4950 Undergraduate Seminar**

Student Name: _____        Synopsis #: _____

|  | Exceeds Standard | Meets Standard | Nearly Meets Standard | Does Not Meet Standard |
|---|---|---|---|---|
| **Identification of Hypothesis** – **SLO 1 (Recognize tested hypotheses)** | q☐Clear and concise statement of paper's hypothesis in a single sentence. | q☐States paper's hypothesis. | q☐Partial statement of paper's hypothesis, or hypothesis statement contains some errors. | q☐No statement of paper's hypothesis, or statement contains numerous errors. |
| **Description of Research Findings** – **SLO 1 (Identify strengths and weaknesses)** | q☐Clear description of the research, including methods and results. q☐Clear & concise description of the contribution of results to the paper's overall conclusions. | q☐Adequate description of the research, including methods and results. q☐Reasonable description of the contribution of results to the paper's overall conclusions. | q☐Limited description of research, including methods and results. q☐One or more experiments not described / evidence of misunderstanding of contribution of results to the paper's overall conclusions. | q☐Little or no attempt to describe methods and results. q☐Little or no evidence of understanding of the contribution of results to the paper's overall conclusions. |
| **Summary** – **SLO 1 (Identify major intellectual contributions)** | q☐Contribution of the work to the field concisely and clearly summarized (SLO 1). | q☐Contribution of the work to the field summarized adequately. | q☐Contribution of work to the field incompletely summarized, or with misunderstandings evident. | q☐No summary of contribution of the work to the field. |
| **Summary** **SLO 4 (Logical organization of data and ideas)** | q☐Organization of data and ideas logical and clear (SLO 4) | q☐Organization of data and ideas logical but less clear | q☐Organization of data and ideas less logical and less clear | q☐Organization of data and ideas difficult to follow and very unclear |
| **Usage and Mechanics** – **SLO 4 (Appropriate language use, basic writing skills)** | q☐No errors in sentence structure and word usage. q☐Scientific terminology used correctly throughout. q☐No errors in punctuation, capitalization, and/or spelling. | q☐Very few errors in sentence structure and word usage. q☐Very few errors in scientific terminology. q☐Almost no errors in punctuation, capitalization, and/or spelling. | q☐Few errors in sentence structure and word usage. q☐Few errors in scientific terminology. q☐Many errors in punctuation, capitalization, and/or spelling. | q☐Several distracting errors in sentence structure and word usage. q☐Little to no use of terminology. q☐Several distracting errors in punctuation, capitalization, and/or spelling. |
| **Citations** – **SLO 4 (Correct use and format of scientific citations)** | q☐Article cited in the correct format with no errors. | q☐Article cited in the correct format with very few errors. | q☐Article cited in the wrong format or citation contains numerous errors. | q☐No citation provided. |
| **Critical Analysis** – **SLO 1 (Identify major intellectual contributions)** | q☐Clear description of individual and group reaction to the critique of the article | q☐Basic analysis of individual and/or group reaction to the critique of the article | q☐Minimal analysis of individual or group reaction to the critique of the article | q☐No evidence of critical analysis of the individual or the group reaction to the critique of the article. |

Oral Presentation/Moderator Rubric (40% of grade)     BIOL 4950: Undergraduate Seminar

**Student Name:** _____     **Date:** _____

| | Exceeds Standard | Meets Standard | Nearly Meets Standard | Does Not Meet Standard |
|---|---|---|---|---|
| **Language Use and Delivery** – The student communicates ideas effectively – **SLO 3 (Oral communication)** | q☐Effectively uses eye contact. q☐Speaks clearly, effectively and confidently using suitable volume and pace. q☐Fully engages the audience. q☐Dresses appropriately. q☐Selects suitable technical and varied words for context, and uses correct grammar. | q☐Maintains regular eye contact. q☐Speaks clearly and uses suitable volume and pace. q☐Takes steps to engage the audience. q☐Dresses appropriately. q☐Selects words appropriate for context, and uses correct grammar. | q☐Some eye contact, but not maintained. q☐Speaks clearly and unclearly at different times. q☐Occasionally engages audience. q☐Dresses inappropriately. q☐Selects words inappropriate for context; uses incorrect grammar. | q☐Uses minimal eye contact. q☐Fails to speak clearly and audibly and uses varying pace. q☐Does not engage audience. q☐Dresses inappropriately. q☐Selects words inappropriate for context; uses incorrect grammar. |
| **Organization and Preparation** – The student exhibits logical organization – **SLO 3** | q☐Introduces topic clearly and creatively. q☐Maintains clear focus on topic. q☐Effectively includes smooth transitions to connect key points. q☐Ends with logical, effective, and relevant conclusion. q☐Ends on time (20-25 min) | q☐Introduces topic clearly. q☐Maintains focus on topic. q☐Include transitions to connect key points. q☐Ends with coherent conclusion based on evidence. q☐Talk ends close to time | q☐Introduces topic. q☐Somewhat maintains focus on topic. q☐Includes some transitions to connect key points. q☐Ends with a conclusion based on evidence. q☐Talk somewhat overtime | q☐No introduction of topic. q☐Does not establish or maintain focus on topic. q☐Uses ineffective transitions that rarely connect points. q☐Ends without a conclusion. q☐Talk way overtime or too short (<15 minutes) |
| **Content** – The student understands and explains the methodologies and findings of the paper effectively – **SLO 1 (Critically review articles)** | q☐Clearly defines research question addressed in paper and its significance. (SLO 1) q☐Provides sufficient context for audience with sufficient understanding of the research and its importance. (SLO 1) q☐Clearly synthesizes results and their contribution to the paper's overall conclusions. (SLO 1) q☐Provides a clear summary of the work and creative suggestions for future questions and work. (SLO 1) | q☐Clearly defines research question addressed in paper and its significance. q☐Provides some context for the research. q☐Clearly synthesizes results and their contribution to the paper's overall conclusions.. q☐Provides a clear summary of the work but has few if any suggestions for future work. | q☐Defines research question addressed in paper but is uncertain of its significance. q☐Provides some context for the research. q☐Attempts to synthesize results and their contribution to the paper's overall conclusions. q☐Provides a summary of the work | q☐Does not define research question addressed in paper. q☐Provides little or no context for the research. q☐Little or no attempt to synthesize results and their contribution to the paper's overall conclusions. q☐Provides little or no summary of the work. |
| **Content (continued: SLO 2 Evaluate sources)** | q☐Clearly explains each of the experiments, including methods, results and statistics. (SLO 2) | q☐Clearly explains most of the methods, results and statistics. May have some difficulty with 1 or more aspects of paper. | q☐Explains most of the experiments, including methods, results and statistics. May have some difficulty with 1 or more aspect of paper. | q☐Is unable to explain many of the experiments, including methods, results and statistics or omits some aspects of paper. |

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|---|---|---|---|
| **Visual Media** – The student uses slides to communicate information effectively – **SLO 3 (organization of ideas)** | q☐Employs appropriate number of slides (~1 slide / minute). q☐Slides well labeled and easy to follow. q☐Figures on slides appropriately labeled (e.g., graph axes). q☐Slides consistently well explained. | q☐Employs appropriate number of slides (~1 slide / minute). q☐Slides are generally well labeled and easy to follow. q☐Figures on slides are appropriately labeled (e.g., graph axes). q☐Slides generally well explained. | q☐Too few or too many slides per minute. q☐Some slides too wordy or difficult to follow. q☐Some slides not labeled. q☐Some figures are missing or are not well labeled (e.g., graph axes). q☐Presenter does not explain all slides clearly or may read some of slides. | q☐There are too few or too many slides per minute. q☐Slides not in the correct order. q☐Slides too wordy. q☐Figures missing or are poorly labeled (e.g., graph axes). q☐Presenter unable to explain slides or simply reads the text from slide. |
| **Questions and Answers and Moderator Ability** – The student provides understanding of concepts and effective moderation of group discussion – **SLO 3 (Oral Communication)** | q☐Demonstrates extensive knowledge of topic by responding confidently, precisely, and appropriately to all audience questions and feedback. q☐Engages the group highly and leads discussion on many elements of the paper | q☐Demonstrates good knowledge of topic by responding accurately and appropriately to questions and feedback most of the time. q☐Engages the group reasonably well and facilitates discussion on several elements of the paper | q☐Demonstrates fair knowledge of topic by responding accurately and appropriately to questions and feedback some of the time. q☐Engages the group somewhat and moderates discussion on 1 or 2 elements of the paper | q☐Demonstrates poor knowledge of topic by responding inaccurately and inappropriately to questions and feedback. q☐Does not engage the group; relies on other students and/or faculty for discussion |