Academic year 2024-2025

MS in Biology - MS-MSBI Learning Outcomes

In-Depth Knowledge

Graduate students will take a comprehensive written exam in the graduate level course. The examination question will be written by the instructor of record for the course. The embedded question will be evaluated using a rubric.

MEASURES	RESULTS	ACTIONS
Exam Evaluation Levels of proficiency: Level # 4 - Excellent: Student can write and develop the information in a clear logical fashion. Student answers the question asked. Answer is thorough and incorporates relevant information. Student includes all relevant information from lecture and text and applies learned information correctly. Level # 3 - Good: Student can write and develop the information in a clear logical fashion. Student answers question asked. Answer incorporates relevant information; however, one or more pertinent facts/observations/ideas are omitted. Level # 2 - Marginal: Student does not write in a clear logical form. Ideas are present but not organized into a meaningful development of topic. Facts are incorporated in a disorganized fashion. Information is missing from the discussion, and irrelevant information is included. Does not appear that the student really understands but knows information from lecture and is hoping it is relevant. Level # 1 -Poor: Illogical assemblage of facts and misinformation. Student does not truly answer the questions, and only includes information that has limited applicability. Direct - Exam (Course) **Target** The desired level of performance will be a mean of 3.0 and above on a four-point scale. Grad Assessment - Exam.pdf	NOT MET **Summary** The classes that typically included embedded changed their format to instead use reports and presentations to evaluate graduate students. We were unaware of this and did not collect any information this year for this out-come assessment data24_25_Question.xlsx **Analysis** The classes that typically included embedded changed their format to instead use reports and presentations to evaluate graduate students. We were unaware of this and did not collect any information this year for this out-come	**Gather Additional Data** **Not Started** Encourage more graduate faculty to incorporate embedded questions into their comprehensive written exams.

Written Communication

Graduate students will demonstrate the ability to apply the scientific method and scientific reasoning when writing biological research papers or proposals in graduate classes that require research papers and for those students writing a master's thesis

MEASURES	RESULTS	ACTIONS
Written Reports	MET **Summary**	**Maintain Assessment Strategy** We are currently teaching graduate students how to develop scientific papers, including going over the structure of scientific papers

A numeric value (1 to 4) corresponding to the level of performance will be assigned to each question on the scientific research report rubric. Scientific research reports and proposals assigned in graduate courses will be used in the assessment. Mean and standard deviations for each rubric metric will be calculated, as will the mean and standard deviation of each report section and overall report scores. Levels of proficiency: Level # 4 - Excellent: Student followed all instructions. Student demonstrated the ability to develop the information in a clear logical fashion. Student was able to draw conclusions from the data and tie those conclusions to ideas presented in the literature. Level # 3 - Good: Student followed most instructions. Student demonstrated an inconsistent ability to develop the information in a clear logical fashion. Student was able to draw conclusions from the data and tie those conclusions to ideas presented in the literature. Level # 2 - Marginal: Student was inconsistent in their ability to follow instructions. Student demonstrated major deficiencies in their ability to develop the information in a clear logical fashion. Student was unable to draw conclusions from the data and tie those conclusions to ideas presented in the literature. Level #1 - Poor: Failure to comply with instructions. Student demonstrated an inability to develop the information in a clear logical fashion. Student did not draw conclusions from the data and tie those conclusions to ideas presented in the literature. Direct - Assignment **Target** The desired level of performance will be a mean of 3 and above on a four-point scale. Grad Assessment - Paper.pdf	The overall mean for the 10 questions on the rubric was at 3.47 ± 0.82 (mean ± sd, n = 20) which is above the desired level of performance. Questions: Are there the required number of pages, double-spaced pages of text not including figures and tables and literature cited? Mean = 3.90 ± 0.45 Is the writing style consistent with scientific writing and is terminology used appropriately? Mean = 3.55 ± 0.60 Are numbers and scientific names written in the proper format? Mean = 3.65 ± 0.59 Is there a clear thesis statement/statement of purpose or hypothesis and objectives? Mean = 3.65 ± 0.59 Is the paper logically organized and are there logical transitions between topics? Mean = 3.15 ± 0.99 Is there a comparison and synthesis of different ideas? Mean = 3.25 ± 0.79 Does the review of the literature support the body of the paper? If a proposal are the methods appropriate? Mean = 3.60 ± 0.60 Are the citations in the proper format in the text and literature cited? Mean = 3.65 ± 0.67 Are there at least ten citations from the primary literature? Mean = 3.40 ± 1.23 If tables and figures are used, are tables and figures formatted correctly, appropriately labeled, and referred to in the text? Mean = 2.53 ± 1.13 assessment data24_25_Paper.xlsx **Analysis** The written communication assessment was performed in seven courses: Ornithology, Ichthyology, Graduate Seminar (Fall), Biomedical Technology, Embryology, Limnology, and Ecology. With a mean of 3.47, the desired level of performance was exceeded. The scientific methods and scientific reasoning form the foundation of the pursuit knowledge in the modern world. A biologist needs to be able to utilize the scientific methods to develop experiments designed to answer specific hypotheses. Data resulting from the experiments then needs to be statistically, logically, and objectively evaluated. No research is then complete until it has been presented to the scientific community in written form. While the overall performance score was above the desired level of performance, the students struggled in specific areas, such as the incorporating tables and figures into the report and formatting issues.	and how to interpret and integrate tables and graphs.

Oral Communication

Oral presentations based on primary literature review will be assigned in the Graduate Seminar (BIOL 5110) course, which is offered during both fall and spring semesters (as well as other courses). The rubric below will be used to evaluate presentations and assess the outcome.

MEASURES	RESULTS	ACTIONS
Grad Seminar Presentations The rubric below will be used to evaluate presentations and assess the outcome. Mean proficiency levels (± standard deviation) will be calculated for of each rubric metric of all presentations during the year; a mean of means will also be calculated. Level of proficiency: Level # 4 - Excellent: No deficiencies (excellent skills demonstrated). Level # 3 - Good: Minor deficiencies in literature organization and presentation skills (student was acceptably prepared for the oral presentation; has a near complete understanding of background issues, experimental design, and methods; only minor difficulty in understanding the results presented and their significance to the building of new scientific knowledge). Level # 2 - Marginal: Major deficiencies in literature organization and presentation skills (student is marginally prepared for the oral presentation; has only a basic understanding of background issues, experimental design, and methods; had difficulty understanding the poignant results presented and their significance to the building of new scientific knowledge). Level # 1 - Poor: Unacceptable literature organization and presentation skills (student is unprepared for the oral presentation; has little understanding of background issues, experimental design, and methods; does not understand the poignant results presented and their significance to the building of new scientific knowledge). Direct - Presentation *Graduate Seminar: BIOL 5110* **Target** The desired level of performance will be a mean of 3 and above on a four-point scale. Grad Assessment - Presentation.pdf	MET **Summary** For the Graduate Seminars, the overall mean for this outcome was 3.23 ± 0.91 (± sd, n = 15) Questions: Were the broad topic and pertinent sub-topics introduced? Mean = 4.00 ± 0.00 Specific research objectives or hypothesis clearly stated? Mean = 4.00 ± 0.00 Were the experimental design and methods presented and understood? Mean = 3.43 ± 0.54 Were the significances of results understood and clearly communicated? Mean = 3.14 ± 0.90 Were the conclusions of the paper summarized on the last slide? Mean = 2.86 ± 0.90 Was the PowerPoint presentation visually attractive, easy to read, clear, and simple? Mean = 2.42 ± 1.13 What was the quality of the presentation style? Mean = 2.43 ± 0.98 Was the student able to answer questions? Mean = 3.57 ± 0.54 assessment data24_25_Presentation_GradAssess.xlsx **Analysis** The oral communication assessment was performed in both Graduate Seminars (Fall and Spring). With a mean value of 3.23, the overall desired level of performance was exceeded. However, specific questions did not exceed the level of performance, particularly the ability come to conclusions and create clear and concise PowerPoints. The ability to communicate clearly is one of the primary tool skills of an educated person. Graduate students will be able to define a focused body of primary literature on a biological subject and synthesize the primary literature into an oral presentation that uses appropriate visual aids to communicate the “big picture” background on the focused research topic, the experimental design and methods used in a specific research investigation, the poignant results, and their relevance to understanding the conclusions and significance of the research. While the overall performance score was above the desired level of performance, the students struggled in specific areas, such as the quality of the presentation and conveying specific conclusions.	**Modify Policies / Procedures** **Not Started** In graduate seminar, the faculty members teach the graduate students principles of a good presentation, specifically how to utilize good slides and how to present oneself in giving the presentation.

Presentations (other courses) The rubric below will be used to evaluate presentations and assess the outcome. Mean proficiency levels (± standard deviation) will be calculated for of each rubric metric of all presentations during the year; a mean of means will also be calculated. Level of proficiency: Level # 4 - Excellent: No deficiencies (excellent skills demonstrated). Level # 3 - Good: Minor deficiencies in literature organization and presentation skills (student was acceptably prepared for the oral presentation; has a near complete understanding of background issues, experimental design, and methods; only minor difficulty in understanding the results presented and their significance to the building of new scientific knowledge). Level # 2 - Marginal: Major deficiencies in literature organization and presentation skills (student is marginally prepared for the oral presentation; has only a basic understanding of background issues, experimental design, and methods; had difficulty understanding the poignant results presented and their significance to the building of new scientific knowledge). Level # 1 - Poor: Unacceptable literature organization and presentation skills (student is unprepared for the oral presentation; has little understanding of background issues, experimental design, and methods; does not understand the poignant results presented and their significance to the building of new scientific knowledge). Direct - Presentation **Target** The desired level of performance will be a mean of 3 and above on a four-point scale. Grad Assessment - Presentation.pdf	MET **Summary** For the non-Graduate Seminar classes, the overall mean for this outcome was 3.62 ± 0.56 (± sd, n = 8) Questions: Were the broad topic and pertinent sub-topics introduced? Mean = 3.63 ± 0.52 Specific research objectives or hypothesis clearly stated? Mean = 3.88 ± 0.35 Were the experimental design and methods presented and understood? Mean = 3.50 ± 0.76 Were the significances of results understood and clearly communicated? Mean = 3.33 ± 0.52 Were the conclusions of the paper summarized on the last slide? Mean = 3.83 ± 0.41 Was the PowerPoint presentation visually attractive, easy to read, clear, and simple? Mean = 3.50 ± 0.77 What was the quality of the presentation style? Mean = 3.71 ± 0.49 Was the student able to answer questions? Mean = 3.51 ± 0.54 assessment data24_25_PresentationOther.xlsx **Analysis** The oral communication assessment was performed in 3 courses that were not the Graduate Seminars: Ichthyology, Immunology, and Cell Biology. With a mean value of 3.62, the overall desired level of performance was exceeded. The ability to clear communicate is one of the primary tool skills of an educated person. Graduate students will be able to define a focused body of primary literature on a biological subject and synthesize the primary literature into an oral presentation that uses appropriate visual aids to communicate the “big picture” background on the focused research topic, the experimental design and methods used in a specific research investigation, the poignant results, and their relevance to understanding the conclusions and significance of the research.	**Maintain Assessment Strategy** This level of performance was chosen because it represents adequate level of training, based on the rubrics, for a person obtaining a master’s degree in science.