LEARNING OUTCOMES, PERFORMANCE INDICATORS & MEASURES FOR M.A. & M.S. IN BIOLOGY

The M.A. and M.S. degrees require 30 credit hours and a comprehensive exam at the completion of coursework. The M.A. degree is designed for students seeking only coursework; the format (written or oral) of the comprehensive exam is determined by an examination committee. The M.S. degree is designed for students seeking research experience, and includes 24 hours of formal course credit, 5 credits of thesis research, 1 credit for a thesis proposal course, and a written research thesis. This degree requires passing a formal thesis proposal defense (which includes oral, written, and visual presentation of the proposed research) and passing a formal defense of the thesis research, which serves the function of a comprehensive final examination. The learning outcomes/objectives outlined below are intended to prepare graduates to be competitive and desired in programs or careers beyond JCU, for employment with non-profit organizations, governments, and private or government consulting agencies that conduct research, or for positions in academics and research.

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Learning Outcomes/Objectives Students will be able to:	Indicators of Performance	Measures	How is the Information Used?
1. Knowledge: demonstrate a deep knowledge of biology and develop advanced competency in specific areas of interest consistent with the primary focus of the program that the student develops with their faculty-based committee.	Understanding of deep knowledge of biology, specifically in areas of interest consistent with the primary focus of the program that the student develops: **A Molecule-to-Cell & Cell-to-Organism**. **B. Organism-to-Biosphere.**	Performance on essay questions or signature assignments in 400- and 500-level courses (results may be reported as "exceeds expectations", "meets expectations", or "doesn't meet expectations"): **A Molecule-to-Cell & Cell-to-Organism:** BL470; BL510; BL520; BL559; BL565; BL571; BL575. **B. Organism-to-Biosphere:** BL406; BL415; BL417; BL419; BL444/L; BL447/L; BL523/L; BL524/L; BL526/L; BL535/L; BL540; BL554; BL554L.	The Biology Assessment Coordinator will collect the evidence from instructors each year. This evidence will be provided to Biology faculty and discussed at a departmental faculty meeting. A biennial report of evidence will be submitted to the university's Director of Assessment.
2. Research Methods & Analysis: demonstrate a deep knowledge of how to use an empirical approach (with appropriate	**A.** Application of critical thinking to design, collect, interpret, and present the student's own original	• Instructors of courses where original research occurs will report performance. Results may be reported as "exceeds	The Biology Assessment Coordinator will collect the evidence from thesis committees each year. This evidence will be

methods, experimental design, and data analysis) to evaluate biological phenomena in new ways.	scientific data in a laboratory/field course. **B.** Accurately evaluating biological information (data, concepts, phenomena) from primary literature that is relevant to the student's original research.	expectations", "meets expectations", or "doesn't meet expectations". **M.S. Students:** Thesis committee will evaluate thesis proposal and defense. Results may be reported as "exceeds expectations", "meets expectations", or "doesn't meet expectations".	provided to Biology faculty and discussed at a departmental faculty meeting. A biennial report of evidence will be submitted to the university's Director of Assessment.
3. Communication: to communicate new biological knowledge (typically obtained during the thesis research) effectively in written, oral, and visual formats.	**A.** Communicating original thesis research effectively in written format. **B.** Communicating original thesis research effectively in oral format. **C.** Communicating original thesis research effectively in visual format.	**M.S. students:** Thesis committee will evaluate thesis proposal and defense to assess oral, written, and visual communication. Results may be reported as "exceeds expectations", "meets expectations", or "doesn't meet expectations". **M.A. students:** Comprehensive examination committee will assess oral, written, and visual communication.	The Biology Assessment Coordinator will collect the evidence from instructors thesis committees each year. This evidence will be provided to Biology faculty and discussed at a departmental faculty meeting. A biennial report of evidence will be submitted to the university's Director of Assessment.
4. For M.S. Students: Original Independent Research: demonstrate the ability to conceive, design, and conduct original scientific research.	**A.** Conceive and design original research. A1 & A2 are required, but A3 will be used as additional evidence. **B.** Implement and complete original research.	**A1.** Completion of BL598 (Master's Thesis Proposal). **A2.** Completion (i.e., passing) a thesis proposal defense. **A3.** Submitting a grant proposal for research funding or permitting. **B.** Receiving a decision of "Pass" by thesis committee during the comprehensive examination (oral or written) on the first attempt.	The Biology Assessment Coordinator will collect the evidence from instructors each year. This evidence will be provided to Biology faculty and discussed at a departmental faculty meeting. A biennial report of evidence will be submitted to the university's Director of Assessment.

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