

Assessment of Biology Senior Exercise

For the Biology Senior Exercise, faculty readers assess how well the student's written work meets the goals of the exercise:

- Use the primary literature as the foundation for understanding and developing ideas and arguments
- Understand and think critically about experimental design and data
- Identify important questions and design new studies.
- Integrate material across several subdisciplines of biology.
- Consolidate and synthesize basic biological information.

Each part of the written exercise is rated on a scale from 0 – 4, with faculty readers providing further commentary for the departmental discussion. The score is meant to reflect, in aggregate, how well the essay meets the particular goals for each part.

Part A. Understand and critique experimental design, techniques, data, and interpretations.

- Articulates the overall logic of well-selected aspects of the focal paper.
 - Describes study's results and how well they support its conclusions.
 - Explores both strengths and weaknesses of the article
 - Directly discusses actual data and figures from the article.
 - Proposes alternate approaches, experiments, or interpretations.
 - Compares and contrasts methods and results to those of similar studies.
4. Demonstrates **deep understanding of** and **outstanding critical thinking about** the focal paper. Claims are exceptionally well supported by specific and detailed evidence from the focal paper and other literature.
 3. Demonstrates **good understanding of** and **strong critical thinking about** the focal paper. Claims are well supported by specific and detailed evidence from the focal paper and other literature.
 2. Demonstrates **solid understanding of** and **adequate critical thinking** about the focal paper. Claims are supported by evidence from the focal paper and other literature. Evidence may occasionally be overly general or lack specific detail. Small errors of understanding may be present.
 1. Demonstrates **shaky understanding of** and **little critical thinking about** the focal paper. Claims are not supported adequately with evidence from the focal paper and other literature. Evidence may be overly general or lack specific detail. Errors of understanding may be common.
 0. Demonstrates **flawed understanding of** and **no critical thinking about** the focal paper. Claims are not supported at all with evidence from the focal paper and other literature. The essay demonstrates complete failure to understand the focal paper.

Part B. Synthesize and integrate biological information.

- Places article in a broad, integrative biological context.
- Connects the article to other work, including work from different subdisciplines, at different levels of organization, and/or using substantially different model systems or species.
- Makes concrete connections between the focal paper and other literature.
- Describes the overall significance and implications of the article.

- Tells a cohesive story across the three essays.
4. Demonstrates **inspired synthesis** and **seamless integration** across a **breathhtaking range** of subdisciplines, levels of organization, and/or model systems. Connections are exceptionally well supported by specific and detailed evidence from the focal paper and other literature. The three essays tell a cohesive story.
 3. Demonstrates **good synthesis** and **strong integration** across a **wide range** of subdisciplines, levels of organization, and/or model systems. Connections are well supported by specific and detailed evidence from the focal paper and other literature. Links are made across the three essays.
 2. Demonstrates **solid synthesis** and **adequate integration** across a **fairly narrow range** of subdisciplines, levels of organization, and/or model systems. Connections are supported by evidence from the focal paper and other literature. Connections may occasionally be overly general or lack specific detail. Small errors of understanding may be present. Few if any links exist across the essays.
 1. Demonstrates **little synthesis and integration** across a **very narrow range** of subdisciplines, levels of organization, and/or model systems. Connections are not supported adequately with evidence from the focal paper and other literature. Evidence may be overly general or lack specific detail. Errors of understanding may be common.
 0. Demonstrates **no synthesis or integration**. Connections are not supported at all with evidence from the focal paper and other literature. The essay demonstrates complete failure to put the focal paper into a broader context.

Part C. Identify important questions and design new studies.

- Identifies important further research questions.
 - Proposes sound experimental designs.
 - Explains how results will be interpreted.
 - Propose experiments using diverse methodologies and approaches.
 - Discusses possible experimental or interpretive difficulties.
 - Demonstrates an understanding of the relevant primary literature.
4. Describes **remarkably creative and diverse** approaches with **exceptionally strong rationales** drawn from the focal paper and other literature. Experimental design is impeccable and technical detail is precise and accurate. Interpretation and possible difficulties are knowledgeably described.
 3. Describes **creative and diverse** approaches with **strong rationales** drawn from the focal paper and other literature. Experimental design is good and technical detail is well described. Interpretation and possible difficulties are well described.
 2. Describes **somewhat creative and diverse** approaches with **adequate rationales** drawn from the focal paper and other literature. Experimental design may have minor flaws and/or be overly general. Interpretation and possible difficulties are described.
 1. Describes approaches that **lack creativity and diversity** with **weak rationales** that may not effectively use the focal paper and other literature. Experimental design may have major flaws and/or be overly general. Interpretation and possible difficulties may not be well described.
 0. Describes **flawed approaches without rationales**. Experimental designs has major flaws is be overly general. Interpretation and possible difficulties are not described.