BIOLOGY
Core Competencies, F2023-S2024

Core Competency: Critical Thinking
Students will be able to examine, critique and synthesize information in order to arrive at reasoned conclusions.

Outcome Measure:
1) Senior Seminar (BIO 4097) Signature Assignment: Science Faith Integration Essay
2) Senior Seminar (BIO 4097) Signature Assignment: Graphing Activity

Criteria for Success (how do you judge if the students have met your standards):
At least 80% of the students will score at a level of 3 or higher for Critical Thinking.

Aligned with DQP Learning Areas (circle one or more but not all five):
1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	% of Students Scoring 3 or higher
	2023-24
Science Faith Integration Essay	**90%, N=54**
Graphing Activity	**94%, N=54**

Conclusions Drawn from Data:
The Biology Department majors scored above the criteria for success for critical thinking.

Changes to be Made Based on Data:
No changes are currently planned. Note that there is no longitudinal data because we changed the assessment.

Rubrics Used
1) See the rubric for the Science Faith Integration Essay (Critical Thinking row only)
2) See Critical Thinking area of the Graphing Activity rubric.

BIO 4097 Grading Rubric for *Integration of Science & Faith* Essay (Critical Thinking row only)

Grading aspect	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Critical Thinking **0 – 25 points**	☐ Issue is stated clearly & position is well-supported with 3 reasons. ☐ Alternate position is clearly addressed. ☐ Clear arguments against the alternate position using personal reflection and/or scientific information ☐ Argument against alternative position demonstrates grace and understanding	Meets 3 of the criteria for a Capstone 4. Comments:	Meets 2 of the criteria for a Capstone 4. Comments:	Meets 1 or none of the criteria for Capstone 4 Comments:

BIO 4097 Graphing Activity rubric for Quantitative Reasoning & Critical Thinking assessment and grading

Question	Criteria for assessment	
	Quantitative Reasoning	**Critical thinking**
1 – What type of graph to use?	Convert relevant information into various forms	
2 – Which data will be graphed?	Convert relevant information into various forms	
3 – What type of statistical analysis would be appropriate?	Convert relevant information into various forms	
4 – Graph construction and labeling	Convert relevant information into various forms	Analyze information
5 – Conclusion based on graph	Draw an appropriate conclusion based on quant. data	Critical thinking
6 – Summary of evidence for the claim		Draw a conclusion linked to evidence
7 – Reasoning as to how the evidence supports the claim	Express quantitative evidence in support of an argument	Construct an argument
8 – Connections between claim and broader context		Make connections between ideas or information
9 – Possible future research		Pose a question for research
TOTAL	___ out of 6	___out of 6

Aspect of assessment	Capstone	Milestone 3	Milestone 2	Milestone 1
Quantitative reasoning	Met 6 criteria	Met 4-5 criteria	Met 2-3 criteria	Met 0-1 criteria
Critical Thinking	Met 6 criteria	Met 4-5 criteria	Met 2-3 criteria	Met 0-1 criteria

Core Competency: Writing
Students will be able to effectively express ideas and information to others through written communication.

Outcome Measure:
Senior Seminar (BIO 4097) Signature Assignment: Science Faith Integration Essay

Criteria for Success (how do you judge if the students have met your standards):
At least 80% of the students will score at a level of 3 or higher for Writing.

Aligned with DQP Learning Areas (circle one or more but not all five):
1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	% of Students Scoring 3 or higher
	2023-24
Science Faith Essay	**92%, N=54**

Conclusions Drawn from Data:
The Biology Department majors scored above the criteria for success for written communication.

Changes to be Made Based on Data:
No changes are currently planned. Note that there is no longitudinal data because we changed the assessment.

Rubric Used
See the attached Science Faith Integration Essay (Written communication row only)

BIO 4097 Grading Rubric for *Integration of Science & Faith* Essay (Writing row only)

Grading aspect	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Written Communication **0 – 25 points**	☐ No, or very few, grammatical and spelling errors. ☐ Essay flow is excellent with a clear introduction to the position held, clear reasons to support the position, and a strong conclusion. ☐ Writing effectively communicates with a college science audience. ☐ Essay is of sufficient length to make a complete defense of the position (800-1000 words)	Meets 3 of the criteria for a Capstone 4. Comments:	Meets 2 of the criteria for a Capstone 4. Comments:	Meets 1 or none of the criteria for Capstone 4 Comments:

Core Competency: Quantitative Reasoning
Students will be able to solve problems that are quantitative in nature.

Outcome Measure:
Senior Seminar (BIO 4097) Signature Assignment: Graphing Activity

Criteria for Success (how do you judge if the students have met your standards):
At least 80% of the students will score at a level of 3 or higher at graphing.

Aligned with DQP Learning Areas (circle one or more but not all five):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	% of Students Scoring 3 or higher
	2023-24
Graphing Activity	**92%, N=54**

Conclusions Drawn from Data:
The Biology Department majors scored above the criteria for success for quantitative reasoning.

Changes to be Made Based on Data:
No changes are currently planned. Note that there is no longitudinal data because we changed the assessment.

Rubric Used
See the Quantitative Reasoning area of the attached rubric for the Graphing Activity.

BIO 4097 Graphing Activity rubric for Quantitative Reasoning & Critical Thinking assessment and grading

Question	Criteria for assessment	
	Quantitative Reasoning	**Critical thinking**
1 – What type of graph to use?	Convert relevant information into various forms	
2 – Which data will be graphed?	Convert relevant information into various forms	
3 – What type of statistical analysis would be appropriate?	Convert relevant information into various forms	
4 – Graph construction and labeling	Convert relevant information into various forms	Analyze information
5 – Conclusion based on graph	Draw an appropriate conclusion based on quant. data	Critical thinking
6 – Summary of evidence for the claim		Draw a conclusion linked to evidence
7 – Reasoning as to how the evidence supports the claim	Express quantitative evidence in support of an argument	Construct an argument
8 – Connections between claim and broader context		Make connections between ideas or information
9 – Possible future research		Pose a question for research
TOTAL	___ out of 6	___out of 6

Aspect of assessment	Capstone	Milestone 3	Milestone 2	Milestone 1
Quantitative reasoning	Met 6 criteria	Met 4-5 criteria	Met 2-3 criteria	Met 0-1 criteria
Critical Thinking	Met 6 criteria	Met 4-5 criteria	Met 2-3 criteria	Met 0-1 criteria

Core Competency: Oral Communication
Students will be able to present biological information orally.

Outcome Measure:
Senior Seminar (BIO 4097) Signature Assignment: Bioethical Issue Oral Presentation

Criteria for Success: At least 80% of students will score at a level of 3 or higher for the presentation.

Aligned with DQP Learning Areas (circle one or more but not all five):
1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	% of Students Scoring 3 or higher
	2023-24
Bioethical presentation	**98%, N=54**

Conclusions Drawn from Data:
The Biology Department majors scored above the criteria for success for oral communication.

Changes to be Made Based on Data: No changes are currently planned. Note that there is no longitudinal data because we changed the assessment.

Rubric used:
See the Oral Communication area of the attached rubric for Bioethical Issue Oral Presentation.

BIO 497 Bioethical Issue INDIVIDUAL Oral Presentation and Information Literacy Assessment Rubric
(Oral communication rows only)

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Command of background material (Oral Comm.)	▫ Issue/problem to be considered critically was stated clearly and described comprehensively ▫ Delivered relevant information necessary for full understanding. ▫ Excellent expansion on PPT slides. ▫ Content appropriate for audience	Meets 3 of the 4 criteria for a Capstone 4	Meets 2 of the 4 criteria for a Capstone 4	Meets 0-1 of the 4 criteria for a Capstone 4
Organization (Oral Comm.)	▫ Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) was clearly and consistently observable and was skillful and made the content of the presentation cohesive.			Meets 0-1 of the 4 criteria for a Capstone 4
Oral Presentation skills (Oral Comm.)	▫ Clearly had practiced several times; smooth transitions ▫ Free of disfluencies (ah, uhm), volume good, engaging voice ▫ Engaged audience through eye contact ▫ Each student's presentation was 6-8 min.	Meets 3 of the 4 criteria for a Capstone 4	Meets 2 of the 4 criteria for a Capstone 4	Meets 0-1 of the 4 criteria for a Capstone 4
Use of Presentation Tools (Oral Comm.)	▫ Clear organization of slides with appropriate formatting ▫ Several graphics/images used and all were matched to topic ▫ Appropriate and concise wording on slides/no single bullets ▫ No spelling or grammatical errors	Meets 3 of the 4 criteria for a Capstone 4	Meets 2 of the 4 criteria for a Capstone 4	Meets 0-1 of the 4 criteria for a Capstone 4
Annotated Bibliography (Info Literacy)	▫ Annotated bibliography with 4 appropriate and related sources submitted to Canvas and on slides ▫ APA formatting followed ▫ All pertinent source information is provided ▫ At least 3 sources less than 7 years old ▫ At least 3 sources are from journals or books (not web pages) ▫ Annotations (1-2 sentences) clearly indicate choice, use and purpose of each reference (including bias)	Meets 4-5 of the 6 criteria for a Capstone 4	Meets 2-3 of the 6 criteria for a Capstone 4	Meets 0-1 of the 6 criteria for a Capstone 4

Core Competency: Information Literacy

Students will be able to use information effectively.

Outcome Measure:

1) Senior Seminar (BIO 4097) Signature Assignment: Bioethical Issue Oral Presentation
2) Senior Seminar (BIO 4097) Signature Assignment: GMO Information Literacy

Criteria for Success: 80% of students will score at a level of 3 or higher in each skill area.

Aligned with DQP Learning Areas (circle one or more but not all five):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

Information Literacy Skill	% of students scoring 3 or higher			
	2024	2023	2022	2021
Evidence (Oral presentation assignment, annotated bibliography rubric)	88%, N=54	66%, n=47	80%, n=55	94%, n=33
Evidence (GMO assignment, information literacy rubric)	87%, N=54	NA	NA	NA

Conclusions Drawn from Data: In general, the Biology Department majors are performing well in the area of information literacy, although in 2023 they did not score as well on the oral presentation assignment. Note that there is no longitudinal data for the GMO assignment because it is new.

Changes to be Made Based on Data: No changes to the program.

Rubric used:

1) Senior Seminar (BIO 4097) Signature Assignment: Bioethical Issue Oral Presentation (Information literacy row only)
2) Senior Seminar (BIO 4097) Signature Assignment: GMO Information Literacy

BIO 497 Bioethical Issue INDIVIDUAL Oral Presentation and Information Literacy Assessment Rubric
(Information Literacy row only)

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Annotated Bibliography (Info Literacy)	▫ Annotated bibliography with 4 appropriate and related sources submitted to Canvas and on slides ▫ APA formatting followed ▫ All pertinent source information is provided ▫ At least 3 sources less than 7 years old ▫ At least 3 sources are from journals or books (not web pages) ▫ Annotations (1-2 sentences) clearly indicate choice, use and purpose of each reference (including bias)	Meets 4-5 of the 6 criteria for a Capstone 4	Meets 2-3 of the 6 criteria for a Capstone 4	Meets 0-1 of the 6 criteria for a Capstone 4

Rows 4 &5 from ACC&U Information Literacy VALUE rubric
(used for GMO Information Literacy assignment)

	Capstone (4)	Milestone (3)	Milestone (2)	Benchmark (1)
Use Information Effectively to Accomplish a Specific Purpose	Communicates, organizes and synthesizes information from sources to fully achieve a specific purpose, with clarity and depth	Communicates, organizes and synthesizes information from sources. Intended purpose is achieved.	Communicates and organizes information from sources. The information is not yet synthesized, so the intended purpose is not fully achieved.	Communicates information from sources. The information is fragmented and/or used inappropriately (misquoted, taken out of context, or incorrectly paraphrased, etc.), so the intended purpose is not achieved.
Access and Use Information Ethically and Legally	Students use correctly all of the following information use strategies (use of citations and references; choice of paraphrasing, summary, or quoting; using information in ways that are true to original context; distinguishing between common knowledge and ideas requiring attribution) and demonstrate a full understanding of the ethical and legal restrictions on the use of published, confidential, and/or proprietary information.	Students use correctly three of the following information use strategies (use of citations and references; choice of paraphrasing, summary, or quoting; using information in ways that are true to original context; distinguishing between common knowledge and ideas requiring attribution) and demonstrates a full understanding of the ethical and legal restrictions on the use of published, confidential, and/or proprietary information.	Students use correctly two of the following information use strategies (use of citations and references; choice of paraphrasing, summary, or quoting; using information in ways that are true to original context; distinguishing between common knowledge and ideas requiring attribution) and demonstrates a full understanding of the ethical and legal restrictions on the use of published, confidential, and/or proprietary information.	Students use correctly one of the following information use strategies (use of citations and references; choice of paraphrasing, summary, or quoting; using information in ways that are true to original context; distinguishing between common knowledge and ideas requiring attribution) and demonstrates a full understanding of the ethical and legal restrictions on the use of published, confidential, and/or proprietary information.