Chemistry
FELO Data for 1d: FA2021-SP2022

Learning Outcome: FELO 1d. Critical Thinking
Students will be able to examine, critique and synthesize information in order to arrive at reasoned conclusions.

Outcome Measure: This outcome will be measured yearly via direct, summative assessment using CHE 1002 Signature Assignment: "Eggs & Critical Thinking Assessment".

Students are assessed on their ability to:
1. Explain: When presented with a problem / issue, are you able to clearly explain the problem, delivering the relevant information necessary to reflect your understanding of the problem?
2. Investigate: When working with the problem / issue, are you able to select and interpret / evaluate the information and develop an analysis or synthesis?
3. Evaluate: As you work with the problem / issue, are you able to methodically analyze your own assumptions, and the information provided by others, to present an informed position / analysis on the problem / issue?
4. Hypothesize: When asked to form a hypothesis, do you consider the complexities of the issue, acknowledge given facts, and present a perspective for further investigation?
5. Draw Conclusions: Are you able to place evidence and perspective to the problem / issue and your investigation of the situation and present logical consequences / implications / conclusions?

Criteria for Success: At least 70% of the students will score at an average of level 3 or higher on the AACU critical thinking rubric (in each of the 5 categories).

Longitudinal Data:

	3 or higher on the AACU critical thinking rubric		
	Summer 2020	**Spring 2021**	**Spring 2022**
Number of students	n=26	n=17	n = 20
category 1 (Explain)	89%	56%	79%
category 2 (Investigate)	100%	61%	95%
category 3 (Evaluate)	81%	44%	84%
category 4 (Hypothesis)	69%	78%	100%
category 5 (Draw Conclusions)	93%	89%	95%

Conclusions Drawn from Data: The students in CHE 1002 met the criteria for critical thinking in all 5 categories in the Spring 2022.

Changes to be Made Based on Data: We will continue to use these questions for summative assessment and try to collect more data before trying to make changes because it is quite challenging to draw reliable conclusion from only two data points. However, one change we hope to make it make sure this is offered at a time that allows for students to perform well.

Rubric Used: The following critical thinking value rubric was used.

Criteria	Ratings					Pts
1- Explanation of issues	**4.0 pts Capstone** Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	**3.0 pts Milestone 3** Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	**2.0 pts Milestone 2** Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	**1.0 pts Benchmark** Issue/problem to be considered critically is stated without clarification or description.	**0.0 pts No Marks**	4.0 pts
2-Evidence/ Investigate	**4.0 pts Capstone** Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	**3.0 pts Milestone 3** Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	**2.0 pts Milestone 2** Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	**1.0 pts Benchmark** Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.	**0.0 pts No Marks**	4.0 pts

3-Influence of context and assumptions/ Evaluate	4.0 pts **Capstone** Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	3.0 pts **Milestone 3** Identifies own and others' assumptions and several relevant contexts when presenting a position.	2.0 pts **Milestone 2** Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	1.0 pts **Benchmark** Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.	0.0 pts **No Marks**	4.0 pts
4-Student's position (perspective, thesis/hypothesis)/ Hypothesize	4.0 pts **Capstone** Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	3.0 pts **Milestone 3** Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	2.0 pts **Milestone 2** Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	1.0 pts **Benchmark** Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.	0.0 pts **No Marks**	4.0 pts

5- Conclusions and related outcomes (implications and consequences)/ Draw conclusions						
	4.0 pts **Capstone** Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	**3.0 pts** **Milestone 3** Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	**2.0 pts** **Milestone 2** Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	**1.0 pts** **Benchmark** Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.	**0.0 pts** **No Marks**	4.0 pts