

**Chemistry**  
**FELO Data for 1d: FA2023-SP2024**

**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			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<b>Number of students</b>	n=17	n = 20	n = 20	n = 20
category 1 (Explain)	56%	79%	90%	95%
category 2 (Investigate)	61%	95%	95%	80%
category 3 (Evaluate)	44%	84%	75%	95%
category 4 (Hypothesis)	78%	100%	85%	95%
category 5 (Draw Conclusions)	89%	95%	90%	95%

**Conclusions Drawn from Data:** The students in CHE 1002 met the criteria for critical thinking in all 5 categories in the Spring 2024. We saw a slight overall increase in scores this year which is not statistically significant but worth noting.

**Changes to be Made Based on Data:** No changes necessary at this point.

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

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

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

<p>5- Conclusions and related outcomes (implications and consequences)/ Draw conclusions</p>						<p>4.0 pts</p>
	<p><b>4.0 pts Capstone</b> 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.</p>	<p><b>3.0 pts Milestone 3</b> Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.</p>	<p><b>2.0 pts Milestone 2</b> Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.</p>	<p><b>1.0 pts Benchmark</b> Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.</p>	<p><b>0.0 pts No Marks</b></p>	

