“In the Murky Middle: Assessing Critical Thinking and Integrative Learning Across the General Education/Major Divide”

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Bridging the General Education/Major Divide: Goals

• Visualize curriculum as comprised of SLOs, not merely courses
• Find 3 courses in the curriculum that reflect general education and program learning outcomes
• Find evidence in these courses of development of critical thinking (via SLOs and courses)
• Implement standardized assessment tools that build on each other
• Measure ‘value-added’ by tracking individual student performance, feedback, and assessment data across the 3 courses
Some Recommended Guidelines

• Target required courses when planning assessments
• Consider when majors enter your curriculum (before or after your introductory courses) and when they take required courses
• Share assessment tools with students
• Share assessment data with department
## A Curriculum of “ELABORATION” and “DEEPENING OF ENGAGEMENT” (STEM)

### UNR Case Study: How do Biochemistry majors demonstrate critical thinking across 3 levels of courses?

<table>
<thead>
<tr>
<th>Aligned Course SLOs</th>
<th>Role of Critical Thinking</th>
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<td><strong>Introductory:</strong> Students will be able to recognize ethical arguments related to science.</td>
<td>Distinguishing ethical dilemmas from facts, critically analyzing texts, responding to others’ opinions and perspectives</td>
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<td><strong>Mid-curricular:</strong> (1) Students will be able to apply their cumulative theoretical and practical knowledge related to biochemistry and molecular biology to address a real world research question. (2) Students will be able to design a research project that includes a testable hypothesis and appropriate experimental objectives.</td>
<td>Ability to adapt research project based on feedback from supervisor and ability to work independently</td>
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<td><strong>Senior:</strong> Students will be able to articulate the significance of and the rationale for their specific independent research project in written and oral form to peer and lay audiences.</td>
<td>Ability to present research methods, conclusions, and potential applications to different audiences</td>
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Introducing Students to Real-World Applications

- Gas solubility: effect of climate change on oxygen amounts in lakes
- Electrochemistry: assembling a battery, technology of fuel cells
- Aqueous equilibria: how our blood acts as a buffer
- Solids and modern materials: technology of nano materials and polymers
- Osmotic pressure: water purification systems
- Catalysis: technology of catalytic converters
- Nuclear chemistry: operation of nuclear power plant vs coal, technology of radiodating