

TIP SHEET #3: *How might the UWF Assessment Plan play out in a typical department?*

Tip Sheet #3 provides one version of how a department might design the UWF Assessment Plan for its major. We have asked Chemistry to tolerate our made-up model on the next few pages to illustrate how the domains could work. Chemistry is a major that also provides a good example if a department opts to add one more domain to the mix that specifically reflects its requirements.

Please note: Chemistry has not designed nor signed on to this model but did give permission to roll it out to foster further conversation and support for the department conversations currently. Any questions that you have about the specifics or transferability of the individual outcomes should be directed to Jane Halonen (jhalonen@uwf.edu).

The document includes possible student outcomes in the left hand column, explanatory notes about how those outcomes might generalize to other majors or programs in the middle column, and some advance speculation about how the outcomes will lend themselves down the road to measurement in the right hand column.

As you think about your own department conversations to identify the program outcomes, it may be useful to think about the kind of characteristics you fall back on when you are describing good performance in letters of reference. Typically, we tend to talk about academic soundness, reliability, character, and communication skills.

What should those standards be for students who will be graduating with your major?

Jane Halonen 9/10/04

PS Old tip sheets are available online at CUTL
Next week we will roll out more generic examples of outcomes.

Tip Sheet #3:

LET'S "EXPERIMENT" WITH THE CHEMISTRY MAJOR

**Student Learning Outcomes
Implications/Possibilities**

Explanatory Notes

Assessment

Student Learning Outcomes Implications/Possibilities	Explanatory Notes	Assessment
<p>CONTENT <i>Demonstrate expertise in the content knowledge of chemistry</i></p> <ul style="list-style-type: none"> • analytical chemistry • biochemistry • inorganic chemistry • organic chemistry, • physical chemistry and • related fields (mathematics and physics) 	<p>This major has specific sub areas that constitute the building blocks of the major. Other programs may discuss the content specs more generally:</p> <ul style="list-style-type: none"> • Recognition and recall of central concepts, principles, theories of X • Identification of critical themes of main ideas of X <p><i>Think of this area as the lowest level in Bloom's Taxonomy: understanding, recalling, comprehending</i></p>	<p>Chemistry's content needs are addressed by their students taking a national exam. For majors that have accreditation processes, a "summative" exam works well. However, if your major doesn't have an exam, you can build one, "buy" one, or—better yet—focus on and evaluate content expertise as it is exhibited in student project work. We recommend the latter course as the most manageable.</p>
<p>CRITICAL THINKING <i>Solve problems using scientific methods</i></p> <ul style="list-style-type: none"> --Identify relevant factors to define problem --Select appropriate method --Employ appropriate statistical analysis and instrumentation 	<p>In this major the emphasis on critical thinking is likely to reflect how scientists use critical thinking to solve problems. However, in other majors, critical thinking may emphasize other dimensions of students' cognitive ability</p> <ul style="list-style-type: none"> • Apply principles and concepts • Evaluate theories for good and 	<p>Student project work—such as a capstone research project—will give you the opportunity to check on student ability to use method as well as verify that they can use the literature properly. The grading criteria you develop for evaluating the quality of the project, particularly when the department has provided input as a</p>

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<p>--Draw reasonable conclusions Use chemical literature effectively and efficiently --Demonstrate basic techniques in on-line searches for specific reference/review articles --Complete comprehensive subject/author searches --Describe importance of patents and search for relevant information --Selects resources based on quality standards, currency</p>	<p>bad features</p> <ul style="list-style-type: none"> • Generate creative solutions that meet disciplinary criteria <p><i>Think of this area as tapping higher level Bloom's skills: applying, synthesizing, evaluating, creating. We include an outcome related to information literacy here that mostly could apply more broadly.</i></p>	<p>group on what standards should be observed, can then serve as the way to measure the department's progress in developing student critical thinking skills.</p>
<p>COMMUNICATION Communicate professionally about chemistry --In writing --In public speaking Exhibit facility with chemical technology --Use and understand modern instruments --Operate computer-based data acquisition --Employ proper calibration practices</p>	<p>Writing and class presentations completed in advanced level classes give students an opportunity to develop skills in these areas. Keep in mind UWF does not require public speaking in general education so students may need some coaching about what professional presentations should look like. In chemistry (and other sciences) this domain might also include technical competence in using equipment to make measurements and communicate results.</p>	<p>Chemistry currently provides for a capstone research experience that requires students to write up a research project and present it to a professional audience. If the final capstone "work" lends itself to external review or "jurying," it clearly can meet state expectations about measuring accomplishments in communication. This external display can be broadened to include presentation before the department or a large scale poster session.</p>

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<p>PROJECT MANAGEMENT <i>Exhibit management skills in chemistry projects</i> --Design and execute projects reasonably for available time constraints --Develop back-up planning skills --Collaborate effectively with team members</p>	<p>Training in chemistry involves being able to execute a plan independently as well as serve as a team member. The nature of the projects done may differ across disciplines but notice how this domain and its outcomes might fit just as well with other disciplines.</p>	<p>See above. This domain might be strengthened from a measurement standpoint if the department adds a self-reflection piece at the end of the capstone project that helps the student take stock about what they learned about themselves as time managers.</p>
<p>INTEGRITY/ETHICS <i>Exhibit chemistry's professional standards in ethical reasoning</i> --Identify principles in ACS code --Recognize ethical components in complex situations --Analyze complex ethical situations and design appropriate solutions --Articulate the responsibilities of a chemist to society</p>	<p>Chemistry has a formal code of ethics to govern its professionals. This set of outcomes expects that students will recognize the point of the principles and be able to apply them without guaranteeing that students will always choose the most ethical course. We hope they will, but we can't guarantee it. We can foster an environment that helps them choose wisely and strive to be conscientious.</p>	<p>Measuring integrity is tough because we don't tend to pay much attention to what is done well, only what is violated. Students completing capstone work might be asked to describe explicitly the ways in which their work reflects the understanding of the code. Alternatively, an ethics course with typical professional dilemmas can provide an embedded measurement.</p>

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<p>--EXTRA "DOMAIN" DRIVEN BY THE NATURE OF DISCIPLINE—</p> <p>HAZARD/RISK MANAGEMENT <i>Practice principles of safety and risk reduction</i></p> <p>--Demonstrate vigilance about safety --Adopt measures to minimize exposure or reduce risk --Handle hazardous materials safely</p>	<p>Not all disciplines will have "extra" outcomes to specify and to measure. However, if you can give an employment or grad school advantage to your student by being able to document their abilities in an area, the assessment plan encourages you to do that. We do not commit all UWF students to be experts at risk management, but future employers of baccalaureate chemists will be grateful if they have learned well this aspect of their work. A department may also choose simply to embed this special outcome in one of the other domains if it makes sense to do so.</p>	<p>Should there be some kind of exit performance that can establish the level of safety that the student has absorbed in the program over the course of the major? Such a performance could be embedded in the capstone. It could be an exam on basic safety strategies with safety levels determined by the department. Alternatively, students could be required to write about the safety precautions they took in their individual projects and prompted to describe the rationale for their strategies to reflect this domain. Or perhaps the department can draft a computerized safety protocol that must be passed before the department believes that they have produced a safe practitioner.</p>