Chemistry-based technology programs
2015 ACS Guidelines for Chemistry in Two-Year College Programs

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Overview

- Background
- Major changes
- Resources
2009 Guidelines

• Supplement
  – 2009 separate document with appendices

• Need
  – Incorporate into main document

• Approach
  – Infuse language specific to chemistry-based technology degree programs throughout
The most significant changes actually permeate the Guidelines, rather than remaining in one section.

As I mentioned earlier, one of our primary objectives was to integrate the chemistry-based technology supplement into the Guidelines, which we did. However, as we began this work, we realized two implications beyond addressing chemistry-based technology programs specifically.

While the Guidelines were always meant to apply to all types of programs in which chemistry is taught, ACS has received feedback that many faculty felt excluded from the Guidelines because they didn’t have dedicated chemistry degree programs. Hence, we decided to explicitly addressing the needs of three types of programs: transfer, chemistry-based technology, and support. (That last one refers to colleges where chemistry is taught but is not necessarily part of a chemistry program.)

Another effect of integrating the chemistry-based technology language was the discovery of just how much overlap there was among programs. For example, chemistry-based technology programs prepare their students for employment upon graduation, so the student skills valued by employers, such as work ethic, safety, and critical thinking, are heavily emphasized. However, these skills are gaining greater prominence in other types of programs, as employers
pressure colleges and universities to ensure their graduates are workplace-ready. Thus, much of the language that was initially added for chemistry-based technology programs was made more general to address the needs of all types of programs.

The second global change was the incorporation of safety language throughout the Guidelines. This was done to support the development of a cohesive safety culture, which requires that safety be an integral part of all functions, not just relegated to one or two policies. The safety language used was adapted from documents developed by the Committee on Chemical Safety (CCS) and reviewed by CCS.

Three significant changes to the Guidelines were a direct result of changes to the ACS Guidelines and Evaluation Procedures for Bachelor’s Degree Programs. Why do the four-year Guidelines impact the two-year guidelines? First and foremost, ACS needs to keep its policies consistent throughout the Society. (Contradictory policies make no sense.)

On a more practical note, approximately 40% of STEM bachelor’s and master’s graduates have taken at least one course at a two-year college. [according to NSF] Aligning policies for two- and four-year guidelines helps support articulation agreements, so students can transfer more easily.

The first change is that the guidelines now have a section directly address the needs of adjunct faculty. As before, colleges are cautioned against excessive reliance on adjuncts. However, colleges are also now encouraged to support adjunct faculty in a manner analogous to that of full-time faculty—provide offices for work and private consultations, provide professional development and full-time employment opportunities, and support efforts to provide consistent, high-quality instruction to all students.

The second change is that the recommended teaching load for a given semester has been increased to 18 contact hours per week, provided that teaching loads for the year average to 15 contact hours. In the four-year guidelines, CPT also drew a distinction between faculty who teach lecture, those to teach only lab, and those who do research, and provided specific contact hour limits for each. At the two-year college level, this is not a meaningful distinction—few, if any, full-time faculty teach lab only, and those faculty who conduct research are not given reduced teaching loads. However, it was agreed that expanding the contact hours would permit more flexibility in teaching assignments.

Finally, the four-year guidelines now include a requirement to address
macromolecules (polymers, biomolecules, etc.) in their curriculum. Programs are left to their own devices to determine the best way to do this. Two-year college programs are encouraged to contact the four-year programs to which their students transfer find out if or when macromolecules need to be introduced into in their curricula.
define three types of programs: transfer, chemistry-based technology, and support. These can all be with or without degrees. In the 2014 Two-Year College Chemistry Landscape survey, about one-fourth of responding two-year colleges had chemistry transfer degree programs, while another quarter had transfer programs without a degree. Just under 15% had chemistry-based technology programs, and the remainder offered chemistry courses but not dedicated program.

The ACS Guidelines for Chemistry in Two-Year College Programs are intended to support all of these programs.

[BJA: depending on the audience, it may be useful to note that all of these categories can have multiple purposes. For example, it is not uncommon for a chemistry-based technology program to also articulate to a four-year chemistry program, which gives students more options. Likewise, transfer programs may incorporate job skills into the curriculum, as students will need them at some point.]

The research section of the Guidelines was expanded to include internships and long-term projects. Internships are a critical component of chemistry-based technology programs and becoming increasingly popular among
transfer students who wish to work in industry someday; students with internship experience are also highly prized by employers. Long-term projects were added a supplement to other experiential opportunities.

Finally, the Partnership section was expanded to address the unique role employers can play in chemistry-based technology programs.
Faculty & Staff

• Professional Development (3.4)
  – Opportunities for faculty will strengthen faculty’s skill in preparing students for the workplace.
  – Examples:
    • Externships
    • Job-shadowing
    • Training
Chemistry-based technology programs are typically designed so that students can start work with minimal additional training. To accomplish this, they need to be able to work with the equipment they will use in the workplace while they are still in school. As a consequence, chemistry-based technology programs typically require more equipment than other types of programs, and much of that equipment is specific to the local industry.

Chemistry-based technology students should be counseled to take the courses in patterns comparable to the course work of freshmen and sophomores at the institutions. This has two impacts: 1) by educating students, not just training them, you are giving them a solid chemistry foundation they can build on to advance their careers, 2) preparing students for eventual transfer giving them more education options, should they decide that is of interest.
A subsection on targeted chemistry-based technology courses has been added (5.10) (NEW)

Because chemistry-based technology programs prepare students for the workplace, they need to be tailored to address the specific skills and knowledge employers expect. Sometimes this is best accomplished by combining standard chemistry courses with additional specialty courses; sometimes, a completely different set of courses is provided. Faculty should work with their partners to determine the most effective course of action.
Internships are a key component of chemistry-based technology programs, so they were incorporated into the Guidelines. They are also useful to any student planning a career in chemistry or a related field. Employers look for candidates with workplace experience, making internships an important component of education. The Guidelines provide some criteria for beneficial internship programs.

Research and internships are not viable at all institutions. Long-term projects can be a convenient alternative. These can be individual or group activities, inside or outside of courses, chemistry-focused or interdisciplinary. Some indicators of successful projects are given in the Guidelines.
Partnerships

• Valuable to all programs for
  – Curriculum development
  – Faculty and institutional support
  – Recruitment and placement of students
• Advisory Boards (10.1)
  – Active members with vested interest in the program
• Employers (10.5)
  – Provide support and experiences that support students’ career development

Advisory Boards 10.1
Members have a vested interest in the success of the program is a critical component of strong chemistry-based technology programs
Resources

- Programs & education
  - Funding
  - Partnerships
  - Preparing students for the workplace
  - Chemistry-based technology program resources

- Curriculum Development
  - Instructional materials for chemistry education
  - Chemical safety
  - Professional, student, or soft skills
  - Research and internships

- Faculty Development
  - Externships

- Other?