



**University of Dayton
Chemistry Department
Assessment Plan
September 15, 2010**

Departmental Mission

The Chemistry Department offers a Bachelor of Science degrees in Chemistry (CHM), a Bachelor of Science degree in Biochemistry (BCM), a Bachelor of Science degree in Medicinal and Pharmaceutical Chemistry (MCM), a Bachelor of Arts degree in Chemistry (CHA), and both thesis and non-thesis Masters of Science degrees.

Learning Outcomes

The Chemistry Department has selected a set of assessment outcomes that map into the University-wide Learning Outcomes from *Habits of Inquiry and Reflection* as indicated below:

1. Scholarship: All undergraduates will develop and demonstrate advanced habits of academic inquiry and creativity through the production of a body of artistic, scholarly or community-based work intended for public presentation and defense.

Chemistry Department Outcomes:

- Graduates will demonstrate research skills required for careers in chemistry and related professional fields.
- Graduates will be adequately prepared for graduate school in Chemistry and related professional fields.

Measures to be Utilized:

- Undergraduate research and thesis.
 - All CHM and BCM majors will complete an original faculty-directed research project in which they demonstrate independent mastery of laboratory, computational, and data analysis skills appropriate to the project, as well as the ability to independently design experiments and execute basic laboratory procedures. CHA and MCM majors will also be encouraged to complete original faculty-directed research projects, though this is not a formal requirement for these programs.

- Each research project will terminate with the composition and submission of a senior thesis. Each thesis will be reviewed and graded for CHM498/499 credit by the student's research advisor. At least 80% of the student researchers will demonstrate a solid understanding of fundamental chemical principles and laboratory instrumentation and procedures, as well as good technical writing skills in their thesis. All theses will be published in the annual Chemistry Senior Research Thesis binder.
- Publications.
 - At least 50% of the CHM and BCM majors will assist their faculty research advisors in the preparation and submission of manuscripts describing their research to peer-reviewed journals, and will appear as co-authors on accepted publications.
- Presentations.
 - All CHM, BCM, CHA, and MCM majors will deliver a presentation on a selected, faculty-approved literature topic which integrates chemistry, ethics, and values in the Professional Practice Seminar (CHM 496). At least 80% of the students will demonstrate a sufficient understanding of scientific and ethical principles and oral communication skills during their presentations.
 - All CHM and BCM majors will deliver an oral presentation of their undergraduate research in the Research Seminar (CHM 497). At least 80% of the students will be judged to demonstrate a sufficient understanding of scientific principles and oral communication skills during their presentations.
 - At least 80% of Chemistry undergraduates engaged in research will present their results at the Stander Symposium.
 - At least 50% of Chemistry undergraduates will deliver poster or oral presentations at local, regional, national and international conferences, such as ACS meetings, undergraduate research symposia, *etc.*
- Participation in professional societies.
 - All CHM, BCM, CHA, and MCM majors will be encouraged to actively participate in professional scientific organizations. At least 60% will actively participate in the student chapter of the American Chemical Society (ACS).

2. Faith traditions: All undergraduates will develop and demonstrate ability to engage in intellectually informed, appreciative, and critical inquiry regarding major faith traditions. Students will be familiar with the basic theological understandings and central texts that shape Catholic beliefs and teachings, practices, and spiritualities. Students' abilities should be developed sufficiently to allow them to examine deeply their own faith commitments and also to participate intelligently and respectfully in dialogue with other traditions.

- These objectives will be accomplished in their entirety in non-Chemistry courses.

3. Diversity: All undergraduates will develop and demonstrate intellectually informed, appreciative, and critical understanding of the cultures, histories, times, and places of multiple others, as marked by class, race, gender, ethnicity, religion, nationality, sexual orientation, and other manifestations of difference. Students' understanding will reflect scholarly inquiry, experiential immersion, and disciplined reflection.

- These objectives will be accomplished principally in non-Chemistry courses.
- In addition to accomplishing Diversity objectives in non-Chemistry courses, Chemistry is exploring the possibility of incorporating Diversity objectives into CHM496 (our one-hour seminar course which is typically taken in the fall of the senior year) by requiring students to develop presentations which incorporate biographies of accomplished chemists (see "6. Measures to be Utilized" below).

4. Community: All undergraduates will develop and demonstrate understanding of and practice in the values and skills necessary for learning, living, and working in communities of support and challenge. These values and skills include accepting difference, resolving conflicts peacefully, and promoting reconciliation; they encompass productive, discerning, creative, and respectful collaboration with persons from diverse backgrounds and perspectives for the common purpose of learning, service, and leadership that aim at just social transformation. Students will demonstrate these values and skills on campus and in the Dayton region as part of their preparation for global citizenship.

Chemistry Department Outcomes:

- Students will engage in collaborative research projects with faculty and peers from Chemistry and other departments.
- All CHM, BCM, CHA, and MCM majors will be encouraged to actively participate and other professional scientific organizations. At least 60% will actively participate in the student chapter of the American Chemical Society (ACS). Of those participating, at least 50% will serve the local community in practical projects, including chemical demonstrations in area schools during National Chemistry Week.

5. Practical wisdom: All undergraduates will develop and demonstrate practical wisdom in addressing real human problems and deep human needs, drawing upon advanced knowledge, values, and skills in their chosen profession or major course of study. Starting with a conception of human flourishing, students will be able to define and diagnose symptoms, relationships, and problems clearly and intelligently, construct and evaluate possible solutions, thoughtfully select and implement solutions, and critically reflect on the process in light of actual consequences.

Chemistry Department Outcomes:

- Students will demonstrate a clear understanding of the relationship between basic and applied research, particularly as related to grant writing.

- To the extent possible, students will participate in research projects aiming at the resolution of important practical problems and issues.
- Chemistry graduates will be adequately prepared in their understanding of foundational chemical principles, chemical instrumentation, and current best experimental practices, for graduate school in chemistry and related disciplines including environmental and forensic science, professional school, the chemical industry.

Measures to be Utilized:

- Participation in applied research projects
 - In accord with its long-standing tradition of engaging students in undergraduate research, at least 80% of student research projects will intersect with work the resolution of current practical challenges, including but not limited to advanced materials, health- and medicine-related issues, and energy/sustainability issues, drawing upon the inherent relationship of Chemistry to these fields.
 - At least 75% of student research participants will indicate that they were adequately prepared for applied research in graduate/professional school and/or the chemical industry during Senior Exit Interviews and post-graduate alumni surveys.

6. Critical evaluation of our times: Through multidisciplinary study, all undergraduates will develop and demonstrate habits of inquiry and reflection, informed by familiarity with Catholic Social Teaching, that equip them to evaluate critically and imaginatively the ethical, historical, social, political, technological, economic, and ecological challenges of their times in light of the past.

Chemistry Department Outcomes:

- Undergraduate students will demonstrate comprehensive understanding of important social issues, particularly in those areas which are inherently related to Chemistry, including but not limited to advanced materials, health- and medicine-related issues, and energy/sustainability issues,

Measures to be Utilized:

- Participation in Professional Practices Seminar (CHM 496)
 - All CHM, BCM, MCM, and CHA majors will take the Professional Practices Seminar (CHM 496) and deliver technical talks on topics with social, ethical, or historical implications

7. Vocation: Using appropriate scholarly and communal resources, all undergraduates will develop and demonstrate ability to articulate reflectively the purposes of their life and proposed work through the language of vocation. In collaboration with the university community, students' developing vocational plans will exhibit appreciation of the fullness of human life, including its intellectual, ethical, spiritual, aesthetic, social, emotional, and bodily dimensions, and will examine both the interdependence of self and community and the responsibility to live in service of others.

Chemistry Department Outcomes:

- Students with a desire for careers in academic or government research will be encouraged to pursue research in the laboratory of a faculty member of the Chemistry Department (or other venues as deemed appropriate by the Department Chair, the Academic Advisor, and the Undergraduate Research Director).
- Students with a desire to enter chemical industry will be encouraged to pursue coops with companies for which they hope to work upon graduation.

Measures to be Utilized:

- In addition to utilizing the “Measures to be Utilized” for Items 4, 5, and 6 above, and in accord with long-standing departmental tradition, the vocational self-assessment of our graduates will be characterized during senior exit interviews.

Assessment Responsibilities

The Assessment Committee Chair (i) develops an Annual Assessment Report based on

- senior exit interviews conducted by the Department Chair,
- a compilation of presentations, publications, and senior theses authored or co-authored by current undergraduate students or recently graduated chemistry majors communicated to him/her by the Department Chair no later than June 1, and
- a compilation of results of a follow-up questionnaire sent to alumni three years after the date of their graduation.

The Assessment Committee Chair (ii) transmits the completed Annual Assessment Report along with a brief summary of its contents to the Department Chair by June 15 each year. The Department Chair incorporates pertinent aspects of the Annual Assessment Report into the Annual Departmental Report, and submits both documents to the Dean by June 30 each year. The Assessment Committee Chair (iii) presents the Annual Assessment Report to the faculty for review and discussion at the first faculty meeting of the fall semester each academic year, at which point the entire faculty re-evaluates the existing assessment process.

Assessment Schedule

1. End of Each Academic Semester

The Department Chair conducts Senior Exit Interviews with all graduating students and submits results to Assessment Committee Chair.

2. End of Each Academic Year

In conjunction with the Director of Undergraduate Research and the departmental administrative assistants, the Department Chair compiles and tabulates presentations,

publications, and senior theses authored or co-authored by current or recently graduated students and submits them to the Assessment Committee Chair by June 1.

The Assessment Committee Chair (i) mails post-graduate survey to alumni three years after their graduation date, (ii) tabulates, evaluates, and incorporates pertinent responses into the Annual Assessment Report, and (iii) submits Annual Assessment Report to the Department Chair by June 15.

3. By June 30 each year:

The Department Chair submits the completed Annual Departmental Report and Annual Assessment Report to the Dean.

The Assessment Committee Chair submits the Annual Assessment Report to the University Assessment Committee.

4. First faculty meeting, Fall Semester:

The Assessment Committee Chair presents the Annual Assessment Report to the faculty for discussion, during which the existing assessment process will be discussed and re-evaluated.

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Actions Taken As a Result of Assessment

Department / Program / Unit / Activity: Chemistry Department
 Date submitted: 9/15/10

1. Outcome/objective/goal reviewed:

Goal:

- Graduates will demonstrate research skills relevant to their careers.
- Graduates will be adequately prepared for graduate school.

Measures to be utilized:

- All graduating CHM and BCM majors will complete at least 3.0 credit hours of CHM498: Senior Thesis, CHM 477/478: Honors Thesis, or a coop experience with a substantive written report and oral presentation of results to the campus community.
- On the Annual Survey of Exiting Students, over 2/3 of graduates will “agree” or “strongly agree” with the statement, “As an undergraduate in the Chemistry Department of the University of Dayton I believe I am adequately prepared for graduate school.”
- On a Post-graduate Survey of alumni to be administered three years after graduation, at least 60% of students will have completed or be currently enrolled in graduate or advanced professional degree programs. In addition, at least 75% of students who have continued to post-graduate study will AGREE or STRONGLY AGREE with the statement, “I believe that my undergraduate experience at the University of Dayton adequately prepared me to succeed in my post-graduate studies.”

2. Changes made since the last time this goal was reviewed: (If this was the first time this goal was reviewed skip to question 4.)

This goal will be reviewed at the Fall Faculty Retreat and evaluated over the coming academic year.

3. What prompted those changes? (previous assessment results, discussions with colleagues, etc) Were the changes effective?

N.A.

4. After reviewing the assessment results the department/program/unit has decided to:

- Stay the course and continue to monitor; we’re satisfied that this goal is being met
- Monitor the results and investigate causes; we may need to make changes in the future; we don’t have enough information to make an informed decision yet

- Make changes (list below)
- Other: ████████

Comments:

████████

5. Changes to goal itself –

After working with this particular goal the department/program/unit has decided to:

- Keep the wording of this goal as is and keep the same measures
- Keep the wording of this goal but use different measures next time (list below)
- Keep these same measures but change the wording of the goal (list below)
- Change the wording of the goal *and* change the measures used (list below)
- Drop this goal entirely (list reason below)

Comments:

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