

UW Department of Chemistry Program Review Report

Date of Site Visit: 1/30/23-1/31/23

Committee Members:

- Cheryl R. Kaiser (Chair), Department of Psychology, University of Washington
- F. Fleming Crim, Department of Chemistry, University of Wisconsin - Madison
- Mo Li, Departments of Electrical Engineering & Physics, University of Washington
- Catherine J. Murphy, Department of Chemistry, University of Illinois Urbana-Champaign

The University of Washington Chemistry Department, led by Dr. Munira Khalil, is an outstanding department, composed of world class scholars conducting innovative research that is advancing their field. The Department of Chemistry is successful far beyond the university resources available to it, and the department has captured impressive funding that has built excellence in the programs. It is a jewel for the College of Arts and Sciences and University of Washington in both research and teaching. Over the last two decades, the department has made singular advances that have improved its standing nationally.

The faculty lead four major National Science Foundation (NSF) funded multidisciplinary research centers: Material Research Science and Engineering Center (MRSEC), Science and Technology Center (STC), Center for Chemical Innovation (CCI), and the Clean Energy Institute). These centers create strong connections across the university, making it an invaluable asset to the entire institution. The faculty's dedication to teaching has resulted in high-quality undergraduate education that serves an enormous number of undergraduates both within the major and across the university, and undergraduates are highly involved in faculty research. The department runs a large PhD program and recently introduced a master's program, and students are receiving strong training that is preparing them for careers in chemistry. Staff, students, and faculty across all tracks praised the department chair for her transformational leadership and vision, and they report that the collegial and inclusive environment she has created supports excellence in all aspects of department life.

UW Chemistry assumes a leadership role in STEM research on the UW campus. It's quite unusual for a Chemistry Department to lead multiple science and engineering centers. Examples are the NSF MRSEC led by Prof. Dan Gamelin, which involves both science (Physics, Chemistry) and engineering departments (Electrical and Computing Engineering (ECE), Material Sciences & Engineering, Chemical Engineering). Another example is the NSF STC led by Prof. David Ginger, which involves ECE and Physics departments. These are all multidisciplinary

research efforts that contribute greatly to the education and training of students at many levels, to the research efforts in the department, and put the department on the map for major initiatives from the federal government point of view.

Bagley Hall is unsuitable for chemical research. It is clear that research infrastructure is a real and present threat to the continued excellence of the Department of Chemistry. The department has risen to new heights, and without new research facilities, it will fall from those heights. Time is of the essence, and failure to meet these needs soon will bring devastating consequences. The instrumentation is barely hanging on, and the neglected original HVAC system leaves department members unable to conduct their research when temperatures rise, and the temperature shifts create a building that is physically unsafe for its occupants.

The state of the building harms graduate recruitment, faculty recruitment and retention, and serves as a barrier to additional grant support. We applaud the College of Arts and Sciences for prioritizing Chemistry for a future building and their initial investment in a design phase. As this moves forward, there needs to be a clear and integrated plan that involves the Chemistry faculty to build a space that supports contemporary research in the chemical sciences. Further, the building should offer modern common facilities (Nuclear Magnetic Resonance (NMR), mass spectrometry, Electron Paramagnetic Resonance (EPR), and others) that are vital for supporting the department's scholarship and educational impact. In addition to the new building, the renovation should include phasing that supports upgrades to the Chemistry Building so that it is up to modern standards. The College will need to continue to actively prioritize the project, protect it from threats from other campus priorities that might attempt to jump the queue, and actively support the department to generate funds for the remaining \$40 million dollars. Advancement support for "brick and mortar" is unlikely to develop on this time scale and the department will need the College to support the balance to create this vital and necessary building.

Our meetings revealed several threats that we consider university-wide problems that severely threaten excellence at the UW. First the lack of adequate paid parental leave policies is a serious barrier to excellence and equity, and it is inconceivable for a university that self-professes progressive values to offer policies that are so far behind its peers and the contemporary workplace. The external committee members both noted that their own universities offer stronger support for parental leave, during this time of transition during the faculty life span. Relatedly, the lack of attention to eldercare policies will only grow more problematic as the same gender disparities that leave women carrying extra childcare burdens characterize the gendered division of elder caregiving labor. Additionally, the lack of a spousal hiring program is at odds with practices at peer universities and may be felt particularly strongly in the sciences where dual career couples are especially common.

Department members noted additional UW-wide threats that threaten excellence, including insufficient institutional support for faculty housing, a broken faculty salary system that has created compression/inversion in all tracks and ranks, and staff salaries that are below market value that make recruitment and retention difficult. While department members support stronger wages for graduate students and postdocs, it is not clear how those wages will be supported as current grants did not budget for these expenses and flat federal funding will support far less research when covering these projected personnel costs. There is a labor crisis on the horizon that threatens to undermine the entire infrastructure for research training and scientific productivity, and the university community is looking toward the administration for leadership and guidance on these critical issues. Finally, staff and faculty report being stretched far too thin, something that came into sharp focus during the pandemic, and they can no longer do more with less. At the same time, the university is asking more of department members with burdensome compliance and operating systems (Workday, Financial Transformation), a lack of resources to address pandemic impacts on student preparedness and teaching, ever increasing administrative burden with excessive paperwork and tasks from central offices (Environmental Health & Safety (EHS), Intellectual Property, Disability Resources for Students). Burnout, fatigue, and poor work-life balance are common across all members of the department, and the university could better support its community by taking a “do less with less” approach and identifying ways to streamline administrative processes and support vital staffing. It is particularly important for a top chemistry department that their relationship with EHS, the safety office, be one of mutual respect and partnership.

Recommendation: We recommend that the Department of Chemistry be reviewed again in 10 years.

Responses to Unit Defined Questions:

1. How do we realize our potential for becoming one of the best chemistry departments in the country? How do we attract and recruit excellent and diverse graduate students, postdocs, and faculty to our department?

The biggest attraction, top faculty, are already here. The potential of these faculty to recruit colleagues and students is significantly hampered by externalities, including inadequate, outdated, and unsafe space, and a lack of faculty housing support, spousal support, and parental leave policies. There is some potential to recruit a more diverse graduate cohort by dedicating some of the masters program's revenue to DEI scholarships that bring top talent here on scholarship and then retain these students as PhD students.

2. We have traditionally used an "open search" model to hire new faculty? Is that the best way to achieve our goals?

Yes, this is working well and there is collegiality with respect to how these searches operate. There is a strong need to hire faculty in experimental physical chemistry, but that can be accomplished with a thoughtful open search.

3. We have one of the largest undergraduate education programs in the country and are committed to providing the best education to our students. Please comment on the following:

a. How do we overcome the mismatch between increasing need for student services and limited resources?

One aspect - DRS needs to be more specific with accommodation recommendations, and the office needs to serve students more efficiently. The pandemic has increased the number of students with disabilities, and this office seems unable to handle the added capacity. The graduate student coordinator could use additional support as the number of graduate students served is much higher than in the other science units. Some departments employ undergraduate students to support this office with the lower-level tasks. The addition of teaching faculty could help to support lower class sizes in the gateway lower-level courses where student needs are especially strong.

b. Is our current curriculum matching the educational needs for the students of today and tomorrow?

Yes -its interdisciplinarity is a big bonus

c. Given the large number of student credit hours we teach, what should be the optimal size of tenure-track and teaching faculty (non-tenure track) for us to meet our goal of providing excellent undergraduate education and introducing new elective classes?

We concur that a size of 40 tenure track faculty and eight teaching track faculty would be ideal with respect to offering a curriculum that effectively meets demand. Short of that, the department might need to strategize about maintaining what they have and if need be, where they can pull back or further constrain the major to function effectively.

d. How should we prioritize our limited TA resources to provide increased individualized attention to our students?

This is not possible unless more undergraduates TA intro level courses. The department could consider hiring recent undergraduates to serve as full time teaching associates, and this would allow for continuity in teaching support placements, which would reduce the amount of training these instructors would need to provide.

4. We have a desire to grow our PhD program by ~20% in the next ten years. How do we accomplish this task and ensure that we are providing the best possible training for our students?

The department would need more space and better space to support these students. The faculty would need to grow and without College investments, grants need to grow by 30% to cover salary increases. Greater standardization around IDPs and annual plans would need to be institutionalized and run by the (currently) short staffed graduate coordinator.

5. How do we retain excellent and diverse students, staff, postdocs, and faculty?

The relatively newly formed diversity committee and faculty evaluative committees are good steps. The diversity committee can be further empowered to support policy setting in other committees. If no funds exist for a PhD level DEI staff person, consider creating an Associate Chair for DEI with a faculty member who will receive support for building stronger structures and procedures that support DEI. In general, the UW needs to take care of their personnel and pay attention to them with policies such as parental leave, spousal hires, and salaries that allow them to live in Seattle. The department should ensure that future leadership continues with the improved communication and transparency that has characterized Professor Khalil's time as chair.

6. We have made a concerted effort to include considerations of DEI when making decisions in all areas of department business, admissions, and hiring. How do we continue to build on these efforts and to sustain them in the long run?

Open searches and best practices are important. However, these efforts are often far too late in the hiring process to have a major impact. Creating diverse talent pools is a long-term process, with relationship building starting as early as the undergraduate years and continuing throughout the graduate and postdoctoral years of potential future faculty. Build stronger long-term relationships with URM students (e.g., keep in touch with URM graduate students who choose other graduate programs, invite URM trainees from other universities to give talks and get to know the department). Participate in national organizations that focus on DEI (National Organization for the Professional Advancement of Black Chemists and Chemical Engineers , Society for the Advancement of Chicanos/Hispanics and Native Americans in Science). Create an Associate Chair for DEI and Community Building. Identify ways to pay undergraduate research assistants so they have more opportunities to participate in laboratories and build relationships with the department.