

Environmental Chemistry - Doctor of Philosophy

Current Compliance Year: 2023-2024

Full review

Recent Recommendations

Feedback will include recommendations from the last Expedited Review or from your most recent review by your school or college. You may not see any feedback or recommendations until you have completed your first full or mid-cycle review.

Response to Previous Recommendations (if any):

The rate limiting step for graduation of a Ph.D. student from our program is the time it takes them to complete work commensurate with the Ph.D. degree, typically taken as three or more dissertation chapters that are the equivalent of publications. We feel that learning to write a first manuscript is most critical and have revised our comprehensive examination procedure to emphasize writing that first manuscript. We believe that all recent Ph.D. graduates completed in between 5 and 6 years, which we feel is reasonable. A few students start in the program but switch to M.S. or leave the program, which makes the ratio of students in program to graduates (our ratio is 8 students / graduates per year) not an accurate reflection of the time to degree for a typical student. We think our statistics are similar to peer Ph.D. programs.

Student Learning Outcomes

The previous Student Learning Outcomes Assessment has been submitted as its own report. Going forward you will use the following prompts to discuss the success of your most recent SLOA plan and address your assessment activities since your last SLOA report (typically the past two years or since your last program review).

Learning outcomes feedback from last review: Feedback and recommendations may not appear until after your first full or mid-cycle review.

Strong

Discuss your SLOA findings, changes you are making and what you hope to see as a result:

See attached SLOA report for discussion.

Discuss the curricular changes made based on assessing your SLO. If you haven't made any curricular changes, please explain why not and address what you did notice in the review, including strengths of your curriculum through the assessment of your outcomes:

As discussed in the time to degree discussion, we changed the comprehensive examinations procedure to increase emphasis on writing a first manuscript and making a complete plan for the proposed dissertation work. We discussed changing the SLOA Plan, but decided the current plan was sufficient, so it was left as is.

Are communication outcomes embedded in the SLOA Plan?

As of 2017 all Baccalaureate programs were required to embed the communication outcomes within their SLOA Plans, this is optional for non-Baccalaureate programs.

Embedded

Student Success

To access the Student Success Dashboard please sign into a UA computer with VPN connection (if not on campus). You will need your UA credentials and it is best accessed with the most updated version of Chrome, Edge, Firefox or Safari browsers; Internet Explorer is not supported. You will need to filter the data to see your programs. If you need assistance in finding the data for your programs, please contact your data liaison or [Julia Manfredini](#) in the PAIR office.

Data Liaisons

Each school or college has a team of Data Liaisons to help you analyze the data provided in the portal and may be able to help you see your data in multiple contexts. You can find a list of data liaisons on the resources page for Program Review.

The college or school level committee will also have access to this data with the goal that by providing these visualizations data availability will be increased.

Data supplied within the dashboard linked below is intended for Academic Program Review and not for any other purpose.

[Student Success Data Dashboard](#)

Previous Feedback: Feedback and recommendations may not appear until after your first full or mid-cycle review.

Student Success Data Trends:

No change in majors, No change in SCH, No change in persistence

If equity gaps were found in any of your disaggregated student success data, please explain how you plan to address those gaps. Please contact your data liaison or make an appointment with [Julia Manfredini](#) to learn more about analyzing your data.

Our program has small numbers leading to variability in student diversity. We actively seek a diverse pool and greater connections with [REDACTED], [REDACTED] and [REDACTED]. The more UAF can do to encourage cogeneration and connect with local communities, and the more UAF is seen as a leader in [REDACTED] education, the more likely we will be able to increase diversity of students in the program.
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Optional Data Explanation

Feel free to share more of your thoughts on the data provided.

N/A

High Impact Practices

According to the AAC&U, High-Impact Educational Practices “have been widely tested and have been shown to be beneficial to college students from many backgrounds.” UAF is particularly interested in Undergraduate Research and/or Scholarly Activity because it is one of our mission fulfillment indicators, but all of these researched High-Impact Educational Practices should be reflected in your program’s student learning outcomes and curriculum.

Previous Feedback: Feedback and recommendations may not appear until after your first full or mid-cycle review.

High-Impact Practices Used in this Program

Please use the following fields to discuss how your program is using the high-impact practices, successes and known issues and solutions, or ways you are considering incorporating them in the future. If you are not using any of the high-impact practices listed, please use the "Other or None of These," filed to share what your program is doing to help students be successful.

High Impact Practices that currently apply to your program:

Capstone Courses and Projects, Collaborative Assignments and Projects, Diversity/Global Learning, Undergraduate Research, Internships, Writing-Intensive Courses, "Service Learning, Community-based Learning", ePortfolios

Collaborative Assignments & Projects

Graduate students work with advisors and peer graduate students on research projects and their communication (e.g., presentations and publications).

Undergraduate Research

We encourage graduate students to work with and assist in mentoring (with advisor guidance) undergraduate researchers.

Diversity/Global Learning

Environmental chemistry problems often connect with local communities, so students often engage with local communities in co-generation of research.

ePortfolios

We encourage continual development of student CVs through annual reporting processes.

First Year-Seminars & Experiences

N/A -- this is a graduate program

Writing-Intensive Courses

Many graduate classes require written reviews of primary literature or synthesis of literature. The written comprehensive examination also stresses written communication.

Service-Learning and/or Community-based Learning

Graduate students are often involved in outreach and education efforts.

Internships

Graduate students often work with user facilities or external collaborations where they are exposed to broader classes of research and can consider career possibilities at the host institution.

Capstone Courses & Projects

Ph.D. students write an extensive dissertation.

Other or None of these (explain)

N/A

Program Profile and Financial Data

The program review elements in this section usually stay consistent for departments. Any responses you provide will be saved for your next visit. So, when it's time for the next program submission, your previous narrative profile answers will be here, ready for editing. You can then decide if any updates are necessary, based on your needs for the next program review cycle.

Financial Data Resources

The Board of Regents shapes program review, through BOR Policy 10.06, to support budget increase advocacy in the state legislature. The standardized financial data template should be analyzed with your data liaison to assess your program's capacity and resource status.

To keep integrity and remain standard across all of UAF it is very important that you do not provide any additional or alternative data.

Financial Template

Your data liaison may have uploaded your template to the Google folder for this program, or you may do so now.

Previous Feedback: Feedback and recommendations may not appear until after your first full or mid-cycle review.

Cost Effectiveness

How does your department/program approach being cost effective?

The E-Chem Ph.D. program teaches only four graduate courses each on an every-other-year basis (one course / semester) and one annual 1-credit graduate student skills class, about 7 credit-hours per year, which keeps costs down. Students from other programs (e.g. M.S. Chemistry) also take these courses, so it is an overestimate to ascribe all the cost solely to this program. Only department-level fiscal data was provided to us, but we attempted to estimate cost for teaching the courses in this graduate program by taking the department's total budget, which averaged ██████/yr and dividing by the average workload units of teaching, which was 145, meaning ██████/teaching unit (credit) times 7 credit hours/yr = ██████/yr.

From student statistics, the majors' annual average SCH load is 14.2 SCH x 9.6 students = 136 SCH / year. At ██████/SCH (in-state rate), this is ██████/yr income to UAF. About half of the graduate students pay international (non-resident) tuition at over twice the cost, leading to an additional income to UAF.

On this simple calculation basis, we see that the program is about cost neutral; however, there are many benefits of graduate programs beyond tuition revenue. Most graduate students are supported on external grants that bring millions of dollars to UAF. Grant revenue relies on strong graduate programs, but the calculation above doesn't count this critical consideration. Students who are supported on TA teach classes and laboratories at a lower cost than faculty members, another benefit not considered.

Program's Value to Mission

Environmental Chemistry investigates chemical processes and flows throughout the environment (air, soil, water), and impacts on peoples and ecosystems. Our program specifically focuses on the North and how the unique and highly seasonal environment affects chemistry. Therefore, our program supports and expands UAF's mission, which "advances and disseminates knowledge through creative teaching, research, and public service with an emphasis on Alaska, the North and their diverse peoples."

Duplicative Programs

There are no duplicative programs in UA.

Community or Other Partnerships

The Environmental Chemistry program held an annual symposium (before COVID) to support graduate student community and research culture. We invited allied groups on and off campus, including local environmental chemistry / engineering / geotechnical / air quality companies and state agencies to participate. Through these interactions students learned of possible careers. We have not held the symposium since COVID interrupted it and are considering how to recreate this community connection. A number of faculty members and students have been involved with the Alaskan Layered Pollution And Chemical Analysis (ALPACA) air quality study (<https://alpaca.community.uaf.edu/>), which has extensive public engagement and connections with state and federal regulators. These partnerships have provided access to field sites and venues to share results with stakeholders.

Value of Service Courses (Optional)

The Environmental Chemistry program held an annual symposium (before COVID) to support graduate student community and research culture. We invited allied groups on and off campus, including local environmental chemistry / engineering / geotechnical / air quality companies and state agencies to participate. Through these interactions students learned of possible careers. We have not held the symposium since COVID interrupted it and are considering how to recreate this community connection. A number of faculty members and students have been involved with the Alaskan Layered Pollution And Chemical Analysis (ALPACA) air quality study (<https://alpaca.community.uaf.edu/>), which has extensive public engagement and connections with state and federal regulators. These partnerships have provided access to field sites and venues to share results with stakeholders.

Post-Graduate Success

All graduates from the period 2019-2023 found employment in their field of specialization after graduation.

Submission**Submitter & Collaborator Names**

William (Bill) Simpson, Jingqiu Mao, Tom Trainor, Sarah Ellen Johnston.

College or School Review Committee

The college or school committees set the tone for helping each program feel seen during this process. We have provided you with strength-based feedback tags to attach to this program review. Please select as many as applicable.

Overall Recommendations

Improve time to degree,Address equity gap,Increase graduates

Explanation of Recommendations

UAF Environmental Chemistry PhD Program is a diverse and highly interdisciplinary field that becomes increasingly important in our changing environment in Alaska and Arctic region. Overall, this program supports and expands UAF's mission "through creative teaching, research, and public service with an emphasis on Alaska, the North and their diverse peoples" despite some big changes in the past several years resulting in budget cuts and faculty member losses. This program has a relatively small number of graduate students, and about half of the graduate students are international students but the Post-Graduate Success is great. The program is successful in all three areas for SLOA: Communication Skills, Technical / analytical abilities, and Independence.

Some improving areas include 1) improving time to degree, 2) increasing graduates, and 3) addressing equity gap through more engagement with [REDACTED], [REDACTED] and [REDACTED].

Student Learning Outcomes Assessment Feedback (tags)

Strong alignment with SLOA plan,"Clear, concise presentation of findings"

Student Learning Outcomes Assessment Feedback (narrative)

The program listed three areas as Intended Objectives/Outcomes for SLOA: Communication Skills, Technical / analytical abilities, and Independence, and the students success through presentations at meetings, by success of grant proposals, and through publication of peer-reviewed articles. However, the minimal requirement for a doctoral graduate (i.e. one manuscript ready for submission at time of defense) vs. the goal (i.e. 2-4+ publications) has wide range and is hard to use as Assessment Criteria and Procedures to judge a doctoral graduate success or not.

Profile Feedback

Program is mission-centric to UAF or college/school,Program is unique in the state,Collaborative with other UA programs,Strong post-graduation success for students,Strong ties to the community or industry

Financial Feedback

High Tuition Revenues,High Grant Revenues,Operates at Low Cost,Opportunities to Increase Revenue,Productive Faculty

Student Success & Equity Feedback

This program has a relatively small number of graduate students, and about half of the graduate students are international students. This program has plans to address equity gaps leading to student diversity. especially looking for connections with [REDACTED], [REDACTED] and [REDACTED]
[REDACTED]

High-Impact Practices Feedback

This program has already reported its use of high-impact practices for supporting student success. Some of the strong areas are:

- 1) Graduate students participating in UAF Capstone Projects and Undergraduate Research.
- 2) Graduate students participating in Collaborative Assignments and Projects through presentations and publications.
- 3) Graduate classes participating in Writing-Intensive Courses through written reviews of literature and the written comprehensive examination.

Dean's Review Feedback

This program addresses important problems with a particular focus on Alaska and the North. Graduates are successful in obtaining employment. Increasing enrollment and addressing equity gaps will further strengthen this important program

Vice Provost Feedback

SLOAs – Provided 3 SLOs; SLO #3 needs to be recast as something tied to skills or abilities acquired as part of the program (i.e., a student learning outcome); SLOs #1 and 3 are written as multiple SLOs, should be revised as a single SLO each with sub-SLOs; the program might consider revising the SLO to include more “action” words (<https://tips.uark.edu/blooms-taxonomy-verb-chart>). Need to address closing the loop and continuous improvement.

HP – Provided overviews of these practices; could have used more details for each practice with specific examples. Not clear if these are required for all students or if students can choose from a menu of options. Frequency of these opportunities? Where in the program/ what classes? Required or optional? What proportion of students involved?

UNIVERSITY OF ALASKA FAIRBANKS
Student Learning Outcomes Assessment Plan
Environmental Chemistry Ph.D. Program
 College of Natural Sciences and Mathematics
 May 2018

MISSION STATEMENT:

The Environmental Chemistry Program provides expertise and training in the application of physical and analytical chemistry to fields that are of critical importance to energy, sustainability, resource utilization and environmental quality. Students are provided core training in pure chemistry sub-disciplines and environmental applications to prepare them for careers in the environmental technology and analysis sectors, federal, state and local government agencies, and academic research laboratories.

GOAL STATEMENT:

Maintain a program of high quality and produce scientists with the training and expertise required to solve current problems and anticipate future challenges. The doctorate program's goal is for students to contribute new knowledge in their chosen area and be able to work as independent researchers.

Intended Objectives/Outcomes	Assessment Criteria and Procedures	Implementation (what, when, who)
1. Communication 1a. Written: Student written communication skills are consistent with professional standards. 1b. Oral: Students effectively communicate their work through oral / audiovisual presentations.	Written: List of peer-reviewed publications, student-led grant applications and grants awarded will be compiled annually. Written comprehensive examinations and written products from core graduate classes will be discussed in a SLOA meeting. Oral: Conference presentations will be compiled and reviewed annually. Student presentations in Chem F691, Research Presentation Techniques and the UAF Environmental Chemistry Symposium are evaluated and documented at time of presentation. Both: Surveys of faculty impressions of graduate student's oral and communication skills will be a part of all and student committee meetings (including oral defenses and exams) Form "Grad Program Assessment Form".	SLOA committee will gather this information from graduate student annual reports. Funding successes will be noted. Pass rates on written comprehensive exams will be compiled. Student presentations and outcomes from Chem F691 will be compiled and discussed at SLOA meeting. Data from Graduate Program Assessment Forms will be recorded at all student meetings, at least annually, and other data/statistics will be discussed at SLOA meetings.

Submitted by:

2. Technical / analytical abilities Graduates attain a level of technical / analytical ability and knowledge to function as professionals in their discipline.	Technical and analytical abilities directly manifest as research successes that can be judged at annual committee meetings, through presentations at meetings, by success of grant proposals, and through publication of peer-reviewed articles. Annual graduate committee meetings will assess technical and analytical skills that will be recorded on the "Grad Program Assessment Form" Employment or continuing education outcomes of program graduates will be compiled as evidence of quality of training.	Research successes are documented by students at annual committee meetings and will be compiled annually. Scientific research underpinning presentations, student-led grant applications, and manuscripts will be discussed at the SLOA meeting. Statistics relevant to technical / analytical abilities will be assessed on the Graduate Program Assessment Form and will be discussed. Employment statistics will be discussed at the SLOA meeting.
3. Independence Doctoral graduates demonstrate that they can independently identify a problem and devise appropriate methods for its solution, contributing original knowledge to that field. Graduates should have demonstrated the ability to develop new research ideas. Graduates will make significant contributions to the peer-reviewed literature.	Abilities to be a Ph.D.-level independent researcher will be assessed through comprehensive examination success rates and will be assessed on the "Grad Program Assessment Form". Dissertation defense quality and research results will be recorded via the "Grad Program Assessment Form". Doctoral graduates should have at least one first-authored publication ready for submission at time of defense. Our goal is 2-4+ publications, depending upon scope, and as defined by the committee.	Pass rates on comprehensive examinations will be compiled and discussed at the SLOA meeting along with statistics relevant to independence from the Graduate Program Assessment Form. Dissertation defense successes will be compiled and discussed at the SLOA meeting. Student publications will be compiled annually and discussed at the SLOA meeting.