

Faculty Development Plan

Assistant Professor
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My primary goal as a professor is to increase students' confidence and capabilities in all aspects of their lives (intellectually, spiritually, professionally and emotionally). My second goal is to develop engaging courses and research. These are my overarching, long-term, or more accurately continuous goals. These will motivate my intermediate and short-term goals.

Teaching

Where I Stand

My greatest strength is in a willingness to listen to students and demonstrate to them that I am doing my best to act in their best interest which eliminates divisive mindsets. I actively seek feedback from student throughout the semester and try to implement changes to address their needs and concerns. Another strength is in my ability to digest complex material and develop simple and diverse ways to present it. I also take time to discuss various learning strategies and philosophies and how to apply them in classwork. I thoroughly enjoyed offering mastery work to my students. Mastery work was an opportunity for a student to rework an exam problem that was particularly difficult for them with me. Every student that took this opportunity improved in their exam scores and cited it as highly helpful. I struggled during my first semester to write manageable exam and homework problems. I want to be able to write meaningful problems with practical applications, but that are not overly difficult. Preparing lesson notes and slides also consumed a lot of my time minimizing the time spent interacting with the students to identify knowledge gaps.

Short-Term Goals/Plans

1. Develop a bank of questions for homework and exam problems
2. Adjust exam and homework structure to promote mastery of learning outcomes (incentivize revisiting problems and concepts that were not fully understood the first time)
3. Develop an open-ended class project that is hands-on
4. Develop an electroanalytical methods course with the Chemistry department

Intermediate Goals/Plans

1. Obtain funding to develop an algorithm for generating and grading complex engineering problems
2. Structure courses to progress based on mastery, rather than due dates
3. Incorporate oral examinations (mastery work) into courses

Research

Where I stand

I have extensive experience molten salt, electrochemistry, and actinide pyrochemical processing. I currently have 18 peer-reviewed journal articles published in these areas. I currently have three research contracts with a fourth one starting in October 2021 in these three areas and an internally funded project. Two projects are in collaboration with Lawrence Livermore National Lab (LLNL) in the areas of molten salts, electrochemistry, and pyrochemical processing. One project is with Savannah River National Lab (SRNL) on actinide pyrochemical processing. The fourth project is being funded by DOE NEUP to establish rotating electrodes for corrosion and property analysis in molten salts. The internally funded project sponsored by College of Engineering focuses on the development of a thin-layer electrochemical cell for molten salts. So far, my projects have been focused in the nuclear material processing area where my three areas of experience converge. I have been and plan to continue to be active in seeking research opportunities in this area. I also want to branch out and build my research profile in electroanalytical methods in nuclear and non-nuclear applications with a focus on methods to apply to metal deposition and novel experimental approaches to electrochemical measurements in molten salts.

My scholarship development plan is to leverage my experience and funded projects to (1) publish an authoritative review article on my previous area of research—concentration measurements with electrochemical methods in molten salts, (2) develop unique tools to make electrochemical measurements in molten salts (i.e., rotating electrodes, thin-cell electrodes, reference electrodes, etc.), and (3) extend the theory of electroanalytical methods to enable unique analysis.

Short-Term Goals/Plans

1. Obtain a grant from competitive funding opportunity solicitation
2. Install and setup all capabilities for the new glovebox
3. Obtain funding for collaborative molten salt electrochemistry research project with Prof. Harb
4. Publish an original research paper on work started at BYU

Intermediate Goals/Plans

1. Obtain sufficient funding to maintain 5 graduate students on average
2. Set up unique high-temperature ($\geq 1800^{\circ}\text{C}$) furnace with inert atmosphere for creating air-sensitive alloys
3. Establish a research center focused on pyrochemical and molten salt research between BYU, University of Utah (Prof. [REDACTED]) Idaho National Lab and other local universities.

Citizenship

My citizenship is composed of two parts: internal and external. My internal citizenship is service that I can offer to my department, college and university. My external citizenship is service that I can offer to my community and technical field. The two parts are complementary. The internal citizenship strengthens the programs and services to improve student learning and growth which supports my community and technical field by generating meaningful research and graduating student better

prepared to contribute. The external citizenship grows a broader, more diverse network which will generate meaningful research and professional opportunities for students.

Where I stand

I currently serve on the graduate committee as well on a master's degree committee (Advisor: Civil Engineering) in addition to my own students. My focus in the graduate committee has been on program culture and recognition. I organized the opening graduate social in a creative way to enable social interaction during the pandemic. I also organized the graduate student recognition seminar at the beginning of January. Again, leveraging unique technology to encourage interaction between students. The main purpose of the recognition awards is to create a sense of community and belonging. Students were able to hear about one another's efforts and even struggles. I encouraged students to be looking out for one another and observing the work of their colleagues to be prepared for the next round of nominations for award. According to the Harvard Business Review¹, "40% of people say that they feel isolated at work, and the result has been lower organizational commitment and engagement." It also cites that "high belonging was linked to a whopping 56% increase in job performance." This was all reported before the pandemic!

Beyond my citizenship in the department, I am serving on the pyroprocessing working group for SRNL's new plutonium facility. In this role, I serve as a formal reviewer of designs and process in the readiness assessment process. I've also review 5 manuscripts and two grant proposals since joining BYU in June 2020.

I would like to continue increasing my citizenship beyond the department to the college, university, and professional societies. The broader and more interconnected my network is, the better I can help students locate and obtain meaningful professional opportunities.

Short-Term Goals/Plans

1. Establish and formalize a department graduate student recognition program which includes monetary awards for "Outstanding Graduate Student of the Year", "Most Impactful Publication of the Year", "Most Collaborative Student" or other award titles. These awards would be nominated by students and faculty and a selection process would be formulated.

Intermediate Goals/Plans

1. Identify and join a professional society (e.g. Electrochemical Society, Institute of Nuclear Material Management, etc.)

¹ <https://hbr.org/2019/12/the-value-of-belonging-at-work>