

## Name Faculty Development Plan

### **Position Description:** *Biochemical Instrument Specialist*

My responsibilities include (1) maintaining the departmental biochemical mass spectrometry instrumentation for proteomics and related research, (2) maintaining the departmental fluorescence-activated cell sorting instrumentation, (3) training faculty and students in the use of these resources, and (4) teaching chemistry classes as assigned by the department chair.

### **Teaching**

#### *Department Expectations*

- Dedicate up to 50% of effort to teaching, mentoring and supporting content for classes. Carry appropriate teaching assignments as designated by the department chair. (Anticipated teaching assignment: 1-3 courses in the first year and 2-3 courses in subsequent years).
- Periodically teach principles of biochemical mass spectrometry in undergraduate and graduate classes, and assist other faculty by giving related classroom presentations when requested.

#### *Self-Assessment*

Teaching is probably the most enjoyable part of my job. I enjoy interacting with the students and thinking of how to improve their experience to help them be as successful as possible. Our interactions are engaging, and I feel comfortable in front of a classroom. Most of my student evaluation scores were around the department average, though I was above average in the “Character Building” category.

I likely have an unjustifiably high opinion of myself as a teacher. The main thing I likely need to develop in order to better serve my students is being more professional and understanding of students’ needs. Part of this will come from experience, but some will require effort to obtain. I come from a family that likes to “rib” each other, both for fun and as a sign of affection. However, my students come from a variety of backgrounds and some will likely interpret any ribbing as hostile, which is the opposite of its intended purpose. Therefore, developing a professional presence will be important to my success in influencing and instructing students.

#### *Goals*

- Over the next year to two years, I intend to focus specifically on my interactions with my students with the goal of improving my professionalism.
- I plan to incorporate more questions for students to work on during my lectures. This should improve student engagement and learning.
- While many of the labs in CHEM 223 teach important fundamental chemical principals, I believe there is room for modernization. Specifically, I would like to find ways to incorporate more advanced methods, such as ICP and GC or HPLC techniques.

### *Resources Needed*

- More student evaluations should help me improve my professionalism.
- It would likely be helpful if I could attend a meeting or conference on analytical teaching labs to learn how instructors at other institutions teach similar courses and especially what labs their students perform.

### *Activities Thus Far*

- I shadowed CHEM 223 when it was taught by Dr. Jeffrey Macedone and have taught one semester of it myself.
- I have changed the exam schedule of CHEM 223 from 3 exams per course to 4 and created 4 new, shorter exams. Several of the questions on these exams are drawn from Dr. Macedone's exams.
- I have added a quantitative element to the atomic emissions lab, making the lab more rigorous and, hopefully, more engaging to the students.
- I have gone through all of my lectures, looking for places to improve and add questions.

## **Professional Service**

### *Department Expectations*

- Assist researchers in collecting mass spectrometric data, performing proteomics and related biochemical measurements, and putting the information in the proper form for publication as a collaborative support to faculty research in the department. While faculty outside the department may use the biochemical mass spectrometry facility and may be assisted when possible, the primary responsibility of the biochemical instrumentation specialist is to department faculty and students.
- Become proficient in and assist faculty and students with biochemical mass spectrometric data analysis.
- Provide training for students and researchers who desire to implement biochemical mass spectrometric analysis into their research.
- Maintain and operate the fluorescence-activated cell sorting equipment, and train and supervise student assistants to maintain and operate this equipment.
- Contribute to the writing of proposals and manuscripts with faculty colleagues as requested.
- Maintain the biochemical mass spectrometry equipment, and keep the instrument in proper and safe operating condition. When maintenance and or repairs fall outside the specialist's expertise, technical personnel may be used after consulting with the chair or associate chair.
- Make recommendations for upgrading or purchasing instrumentation as needed. Be informed regarding new instrumentation, software, etc. that become available. Take the lead in writing proposals for funding for these purchases.

### *Self-Assessment*

Both the biological mass spectrometry and fluorescence-activated cell sorting core facilities are up and running. In the past year, 11 groups have used the cell sorter and 14 groups have used the mass spectrometry facility. I have attended trainings for

operating the cell sorter (weeklong course at UC David) and for using the data analysis software we use in the mass spectrometry facility (two-day training by Bioinformatics Solutions Inc. the software publisher).

The workflow for the mass spectrometry facility is smooth and seems to be getting researchers high quality results. For example, Dr. JC Price's group needs to be able to identify peptides using mass spectrometry and determine the ratios of different isotopes in these species with high fidelity. Working with them, we have been able to improve the number of peptides for which good isotope data can be measured from less than 1,000 peptides to now greater than 4,000 peptides. The cell sorting facility is also producing good results, i.e. cell samples that are greater than 95% pure, though we are working on improving the training for new users.

As I work with researchers from different departments and colleges, I am quickly learning which projects to engage in and which to recommend to other facilities or propose alternate strategies for. The trickiest part of running these facilities is often giving investigators bad news or telling them they have done something wrong without damaging collegiality.

### Goals

- Developing well written, quality policies should help in delivering bad news or dealing with researchers who have made errors in the facilities I manage.
- The quality and types of information our facility can obtain would be greatly enhanced by obtaining an ion mobility instrument for the mass spec facility. This will likely require grant writing and/or requesting university funds. Possible funding sources include the Department of Defense's Defense University Research Instrumentation Program, which has a 0% university cost share, and the National Science Foundation's Major Research Instrumentation Program, which has a 30% university cost share.
- I think it would be both enjoyable and beneficial for me to serve on a government funding agency review panel. I think this would help me develop some of the skills I need to be successful at obtaining external funds for instrumentation.
- I am developing a piece to attach to the q-TOF that will allow us to introduce a mass calibration standard to all of our runs in order to improve mass accuracy.
- I am collaborating with Dr. Michaelis on designing and synthesizing a mass tag with a quaternary amine that would enhance free amino acid analysis.
- I want to recruit highly skilled and motivated undergraduate students to work in the cell sorting facility. This will provide the double benefit of providing the department with quality people to help them sort their cell samples and also provide students with marketable skills. I currently have three undergraduate assistants being funded by URA.
- I need to develop a training course for new cell sorter users.
- Reading a book, like *Crucial Conversations*, may help in delivering bad news to researchers.

### Resources Needed

- Funds to buy an ion mobility instrument.

### *Activities Thus Far*

- I have installed three computers with high processing power for analyzing mass spectrometry proteomics data, which in many cases has likely reduced the processing time for these data from days to hours. I also purchased the PEAKS software package for these computers, which has dramatically improved the quality and quantity of ID's and the quality of quantitative information for proteomics data we obtain compared to what was being obtained with the free software packages commonly used in our department.
- I attended a training on how to use the PEAKS software package, which has enabled me to help researchers get higher quality data.
- I have given trainings to students and researchers on how to use PEAKS, allowing them to use the software independently.
- I have consulted with groups on how to improve their sample quality and design their experiments.
- I tried to submit a proposal to the Department of Defense's Defense University Research Instrumentation Program to obtain funds for an ion mobility instrument. However, the proposal was never submitted due to an error.
- I am currently mentoring three students on URA.
- My undergraduate assistants and I have reorganized the cell sorter room to optimize the space. We have also cleared out a lot of old equipment and gotten new tables and chairs.
- At the suggestion of a flow-cytometry technician, I purchased a small sonicator for the cell sorter room. We use this to clean the nozzles daily, which has almost completely eliminated clogging in the nozzles.
- I attended a weeklong flow cytometry and fluorescence-activated cell sorting training course offered at UC Davis.
- I applied for a Mentoring Environment Grant to obtain funds for my undergraduate assistants to attend a similar training.
- My undergraduate assistants and I are currently developing a training course for new and existing cell sorter users.

## **Citizenship**

### *Department Expectations*

- Serve on department, college and university committees.

### *Self-Assessment*

Overall, I feel good about my citizenship involvement. I believe I contribute very well to problem solving and planning. I have learned through serving on church councils and committees that I am not the guy that comes up with great ideas. Rather, I am most often the guy that comes up with somewhat decent ideas that the group can edit and turn into great ideas, and the great ideas that are developed from my good ideas are used fairly frequently. I am a seed planter, and that's how I contribute to the team.

### *Goals*

- Serve on committees as assigned by my department chair, college dean, etc.
- Create a “Core Facility Committee.”
- Develop an authorship policy for publications containing data obtained at department core facilities.

#### *Activities Thus Far*

- I currently serve on the “Mass Spectrometry Committee.”
- I have proposed dissolving the MS and XRD committees and combining them into a single “Core Facility Committee,” which would also encompass the NMR facility run by Dr. Burt. This new committee, I believe, would better address the needs of the core facilities, their directors, and their users.
- I am also currently working on an authorship policy for publications containing data obtained at department core facilities. This policy will affect any publication containing data obtained at a core facility within the Department of Chemistry and Biochemistry.
- I also try to actively participate in faculty meetings to find solutions to department problems. For example, our department is often dinged for not having large enough teaching loads. So, I suggested creating individual 297R and 497R courses for each professor with undergraduate research students, allowing the department to more accurately report to the college and university our departments work load. This suggestion has been taken up and appears to be widely popular.

# CHEM 223 - Quant + Qual Analy

## Spring 2018

W141 BNSN on M W from 10:00 am - 11:50 am, C131 BNSN on M W F from 1:00 pm - 4:50 pm

### Instructor/TA Info

#### *Instructor Information*

Name: Name

Office Location: E114 BNSN

Office Phone: 801-422-7123

#### *TA Information*

Name: Kala Harbaugh

Office Hours: Only By Appointment

Email: kala.harbaugh@gmail.com

Name: Tahereh Gholian Avval

Email: tgholian@yahoo.com

### Course Information

#### *Description*

The purpose of this course is to broaden the laboratory experience for students pursuing Chemistry minors. Gaining experience in the laboratory means developing practical skills as well as developing and demonstrating a solid understanding of good laboratory technique and theory. Initially, this course reviews basic principles from Chem. 105 and 106 and builds on those basic skills. Then, we will move towards more advanced chemical analysis methods in theory and practice. Please note that there is a lab fee for consumables used for the lab. If you break glassware or other items in the lab, you will be charge to replace the equipment.

#### *Prerequisites*

Chemistry 105, 106, and 107 (or Chemistry 111, 112, and 113)

#### *Materials*

EXPLORING CHEMICAL ANALYSIS 5E by HARRIS, D

#### Lab Fee

SAPLING LEARNING FOR ANALYTICAL CHEMISTRY (6 MONTH ACCESS CARD) by SAPLING LEARNING

### *Grading Scale*

Grades	Percent
A	93%
A-	90%
B+	87%
B	83%
B-	80%
C+	77%
C	73%
C-	70%
D+	67%
D	50%
D-	0%

### *Grading Policy*

Lectures are intended to discuss, illustrate, and demonstrate concepts and applications of chemistry; to complement personal study. Students are expected to prepare for class by reading the text associated with each lecture. During the course of a particular lecture, we may not cover every portion of the assigned reading, but that should not be taken as an indication that the material associated with the assigned reading is not important.

Laboratory work is a main component of this class. Each experiment will be graded for accuracy and precision. In addition, be aware that our time in the laboratory is limited; be prepared by reading and studying the lab procedure in advance. Short quizzes will be given on the first day of each lab to help motivate you to be prepared. You will need to keep careful notes of what you do in the lab in your laboratory notebook. We will provide some instructions on how this should be done. A separate lab report will be submitted for each lab. Make-up labs are not possible.

The purpose of homework is to give students additional opportunities to gain experience and practice solving problems in chemistry. Homework is assigned to coincide with the material presented in lectures. The assignments are designed to build skills and teach principles. Keeping pace with the course schedule is important. Check Sapling Learning (<http://www2.saplinglearning.com/>) for due dates. Late penalties are applied at the rate of 10% per day past the due date. (10 mins. late = 10% penalty). Instructions on how to register: <http://www2.saplinglearning.com/help/higher-education-us/accounts-andregistration>

There will be four exams throughout the semester. Exams are designed to test your knowledge and ability to work with the material presented in this course. The schedule for these exams is listed in the schedule section of Learning Suite. An equation sheet (available in content area) will be provided for you with each exam. The individual problems on an exam will vary in difficulty and some problems may require you to approach a problem from a direction you have not experienced before. The final exam and key will not be distributed, and MUST be taken DURING finals week. For test availability, please visit: <https://testing.byu.edu/info/finals.php> (<https://testing.byu.edu/info/finals.php>). Taking a test late carries up to a 20% penalty.

IMPORTANT: All grading issues must be resolved before the last day of lecture. Learning Suite rounds up final grades in the third digit past the decimal point.

### *Study Habits*

Before class:

A big key to success in Chemistry is multiple exposures to new material. The first step is to read the sections assigned on the schedule. It is truly a critical component to your study because it briefs your mind on the subject before you walk into class. When reading to prepare for class, take notes on the important "players" in the story of what you are reading so you know the "plot". Write down questions that you have.

In Class:

Take notes on the most important points to *you*. Don't spend so much time taking notes that you get behind. This is your moment, pay attention in class. Avoid distractions, silence your cell phone.

After Class:

Review the notes you took. Once you think you really understand, check yourself. Do you still have lingering questions? Were all the questions you had before class answered? Once you think you have learned the material, go work on the homework. Visit with TA's or go to the instructor's office hours for clarifications on details of concepts which are still unclear to you.

Before the Exam:

Practice additional problems at the end of the chapter and review class examples. Work these problems without looking at the answers. Change one of the numbers or properties and see if you are confident in what the answer will be. Be careful that you are not just memorizing the answers. Review the necessary skills list and make sure that you not only have a breadth of knowledge, but that you also understand each topic well.

### *Teaching Philosophy*

Establishing the learning atmosphere in the classroom requires the participation of both instructor and student. When all is said and done, an instructor can only *teach*; the *learning* part is up to you. I believe that because of the abstract nature of Chemistry as a science, several exposures are necessary to fully grasp the concepts. In the classroom, I proceed on the assumption that students are prepared for class. The assumption I am making is that students read before class, and that is their first exposure to the topic. So when they come to class, they are familiar with the major ideas of a section, but may not recognize the connections, or applications of the topic. I design my lectures to clarify these through images, demonstrations, examples, etc. But, in the end, learning will take hard work on your part, and that is something I can't do for you.

## **University Policies**

### *Honor Code*

In keeping with the principles of the BYU Honor Code, students are expected to be honest in all of their academic work. Academic honesty means, most fundamentally, that any work you present as your own must in fact be your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university. Students are also expected to adhere to the Dress and Grooming Standards. Adherence demonstrates



respect for yourself and others and ensures an effective learning and working environment. It is the university's expectation, and every instructor's expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have questions about those standards.

### *Sexual Misconduct*

In accordance with Title IX of the Education Amendments of 1972, Brigham Young University prohibits unlawful sex discrimination against any participant in its education programs or activities. The university also prohibits sexual harassment-including sexual violence-committed by or against students, university employees, and visitors to campus. As outlined in university policy, sexual harassment, dating violence, domestic violence, sexual assault, and stalking are considered forms of "Sexual Misconduct" prohibited by the university.

University policy requires all university employees in a teaching, managerial, or supervisory role to report all incidents of Sexual Misconduct that come to their attention in any way, including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Incidents of Sexual Misconduct should be reported to the Title IX Coordinator at [t9coordinator@byu.edu](mailto:t9coordinator@byu.edu) or (801) 422-8692. Reports may also be submitted through EthicsPoint at <https://titleix.byu.edu/report> (<https://titleix.byu.edu/report>) or 1-888-238-1062 (24-hours a day).

BYU offers confidential resources for those affected by Sexual Misconduct, including the university's Victim Advocate, as well as a number of non-confidential resources and services that may be helpful. Additional information about Title IX, the university's Sexual Misconduct Policy, reporting requirements, and resources can be found at <http://titleix.byu.edu> (<http://titleix.byu.edu>) or by contacting the university's Title IX Coordinator.

### *Student Disability*

Brigham Young University is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have any disability which may impair your ability to complete this course successfully, please contact the University Accessibility Center (UAC), 2170 WSC or 422-2767. Reasonable academic accommodations are reviewed for all students who have qualified, documented disabilities. The UAC can also assess students for learning, attention, and emotional concerns. Services are coordinated with the student and instructor by the UAC. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures by contacting the Equal Employment Office at 422-5895, D-285 ASB.

Name

Faculty Development Series

Citizenship Project Proposal

- University Citizenship: I will serve on committees as directed by my department chair and participate in preparing students for and judging presentations at the Spring Research Seminar held annually at BYU.
- Global Citizenship: I will continue to be active in the American Society for Mass Spectrometry and the Human Proteome Organization. This includes attending conferences and contributing reviews for discipline journals.

Name  
Faculty Development Series  
Course Development Project Grant Proposal

### **Demonstration Supplies**

I would like to purchase a number of classroom supplies, including molecular models, colored lenses for demonstrations on light absorption, magnets, salts that burn different colors, chemicals to make a simple battery, lab goggles, a lab coat, etc. These supplies will enhance learning for my students and, in some cases, provide hands-on learning activities for the students.

Name  
Faculty Development Series  
Professional Project Proposal

My professional project proposal is twofold. (1) I intend to develop a piece to attach to one of our instruments (a quadrupole/time-of-flight mass spectrometer) that will allow us to introduce a mass calibration standard into all of our measurements. This will enhance the accuracy of our measurements and expand the number of experiments we can perform using this instrument. (2) I want to design and synthesize a chemical that can be added to biological samples to improve our ability to detect amino acids. This project will be performed in collaboration with Dr. David Michaelis in the Chemistry & Biochemistry Department.

Name  
Faculty Development Series  
Second Semester Teaching Goal

I likely have an unjustifiably high opinion of myself as a teacher. The main thing I likely need to develop in order to better serve my students is being more professional and understanding of students' needs. Part of this will come from experience, but some will require effort to obtain. I come from a family that likes to "rib" each other, both for fun and as a sign of affection. However, my students come from a variety of backgrounds and some will likely interpret any ribbing as hostile, which is the opposite of its intended purpose. Therefore, not just in my next semester, but over the next year to two years, I intend to focus specifically on my interactions with my students with the goal of improving my professionalism.