**Sample Faculty Development Plan, August 2020**

**A. Self-assessment**: I am a chemist specializing in the study of solid materials using nuclear magnetic resonance (NMR) spectroscopy and the methods of theoretical chemistry. My primary aim over the past decade has been to develop techniques for characterizing solids that are difficult or impossible to analyze by more conventional methods. I have authored or co-authored 63 manuscripts in peer reviewed journals and three book chapters. This work has resulted in five patents related to my work. I received a PhD from the University of Utah in physical/analytical chemistry followed by a one year postdoctoral experience at Montana State University working with professor Gary Strobel. Following postdoctoral work, I was employed for nine years as a staff scientist at the David M. Grant NMR center at the University of Utah. In 2011, I joined the faculty at the University of Central Florida and an assistant professor (2011–2017) and was promoted to associate professor with tenure in 2017.

As a manager of graduate students, I emphasize having written goals that are clear and achievable. Tasks are divided into weekly segments that lead to semester long goals. Weekly research meetings assess progress towards goals and facilitate understand of difficult concepts relevant to individual career goals. Student contribution to these written goals is mandatory because writing is such an important part of any job of a PhD scientist. Graduate students also gain experience as mentors by guiding undergraduates as they participate in my laboratory.

I am strongly committed to laboratory safety and comply with all relevant legal standards. Students that participate in research projects in my laboratory can be confident that they will experience a safe environment. Of equal importance, students are assigned individual responsibility within the lab and take ownership for individual and group safety. These responsibilities are reviewed and adjusted each semester.

**B. Faculty Development Goals (3rd year review in 2022)**

**Scholarship Plan**: The focus of my laboratory is on developing NMR methodology for establishing crystal structures in materials that have eluded characterization for decades using conventional methods. Specific areas of focus will be to (i) characterized high-profile materials that have previously eluded characterization, (ii) Seek out published structures that are known to contain errors and correct a representative set of these structures (iii) develop general methods for characterizing a type of solid known as “co-crystals”, i.e. materials that form with two molecules present in a 1:1 ratio in the solid state and which often elude characterization. In the first three years, this research will be supported by start-up funds from BYU and by an NSF CAREER grant transferred from the University of Central Florida.

Results from this research will be presented as publications in high impact journals and will provide the preliminary results needed to attract additional financial support for agencies such as NSF, NIH, DOE, DARPA etc. A second path for presenting research results will be as talks or posters at international meetings. Suitable meetings include the Experimental NMR Conference, Rocky Mountain Conference, Eastern Analytical Symposium and Small Molecule NMR conference. Goals for publications and presentations are 2-3 papers per year and one presentation per year.

Publications provide the preliminary results needed when applying for grants. My goal is to apply for 2–3 major grants per year with the aim of obtaining at least one by 2022. Application for smaller internal grants is also important and the aim is to apply for 1–2 smaller grants per year. An associated aim is to have grant applications completed 3 weeks before the due date to allow time for peer editing.

I will recruit graduate and undergraduate students that are suited to the laboratory aims. I currently have two PhD seeking graduate students and will seek to recruit 1–2 more each year until 2022. New graduate students will be encouraged to apply for the NSF Graduate Research Fellowship (GRFP). Graduate students are expected to begin publishing by their third year and publish at a rate of one paper per years thereafter. Each student will present their research results annually at the Spring Student Research Conference or at regional/national/international meeting as opportunities permit.

Advice from mentors, colleagues, reviewers of grants and manuscripts represents an invaluable resource and I will be responsive to such input. Demonstration of my scholarship will be in the form of publications (seven publications in the first three years), presentations (one presentation per year at a national meeting) and in funded grant proposals (one major and 1–2 smaller awards).

**Teaching Plan**: My teaching aim is to communicate the principals of chemistry in a manner that allows student to understand nature at the molecular level. Although the scope of this presentation may be limited in freshman level courses, those areas cover will be clearly and logically presented. My teaching will also include opportunities for students to practice chemistry concepts in real time by including a set of worksheets for each topic that follow the so-called “Process Oriented Guided Inquiry Learning” (POGIL) model developed by the National Science Foundation. This approach involves distributing worksheets during class immediately after challenging concepts are discussed. By providing POGIL time for students to practice and by providing assistance as needed from myself and from teaching assistants, concepts causing problems can be more quickly identified and addressed.

My teaching assignments includes the standard freshman level general chemistry courses and other courses within my division (i.e. physical chemistry). In addition to this teaching, I aim to develop and teach a course in my specialized area of research - NMR spectroscopy. This NMR course will focus on the methods of solution state NMR and emphasize foundational concepts including relaxation theory, phase cycling, energy level diagrams etc. The primary learning outcome is that upon completion of the course, students will be able to provide state-of-the-art NMR contributions to their individual and collaborative research projects. Students from chemistry, physics, engineering and biology may benefit from an NMR course, and recruiting from these departments is an objective.

Effective teaching requires that a professor be available and I will maintain regular office hours. I will also seek feedback from my teaching mentor, other chemistry colleagues and students. Since Ph.D. scientists are not formally trained in how to teach, I aim to read suitable book on how to improve as a teacher. Representative books include:

* How Students Learn: History, Mathematics, and Science in the Classroom (M. Suzanne Donovan),
* Teach Students How to Learn (Sandra McGuire)
* Facilitating Seven Ways of Learning (James R. Davis et al.)

**Citizenship Plan**:

As a professor at BYU I am a citizen of several communities including the chemistry department, the college of science, and the university. As a member of these communities I will serve on a reasonable number of committees with the aim of improving the department, college and university. Good citizenship also requires exemplary management of financial resources and I am committed to wisely use departmental, college and university financial resources.

At present, my citizenship duties include managing and organizing the undergraduate tutorial center for students in the freshman chemistry courses CHEM 101, 105 and 106. My duties include organizing a schedule for the teaching assistants (TAs), selecting four supervisors from among the TAs and having weekly meeting to verify that all tasks are being performed. In the past Winter semester over 1500 individual students visited the tutorial center with nearly half of these students coming multiple times. This usage rate indicates that the tutorial center is a valuable university resource. In the coming year, I will convert the tutorial center into primarily an online resource for students. This is necessary because of the risks from the coronavirus. Initially, I will allow a limited number of student/TAs (ca. 15) to meet on campus consistent with the requirements of social distancing. This in-person meeting time will be monitored and adjusted based on successes and failures in the first month. An advantage of this online format is that it opens new possibilities for tutoring that have not been available before. For example, traditional hours for the tutorial center have been 9 AM to 4 PM. In Fall semester 2020, two hours of on-line evening tutoring will be added. In-house software is available for monitoring participating in the tutoring and such participation will be regularly evaluated and hours adjusted to meet the demand.

Another citizenship duty includes serving on the committee that reviews and grants undergraduate research awards (URAs) to chemistry undergraduates. Membership on this committee has traditionally required committee member to (i) conducting a workshop that assists student in the process of applying for URAs and (ii) reviewing URAs and approving/rejecting them and making specific requests for improvements if the writing or proposals have minor errors. Very recently I have participated in overhauling this process by replace the workshop with a video presentation. New URA applicants can now watch online and thus avoid social distancing concerns. To further alleviate concerns related to the pandemic, the review process has also changed to more fully include individual professors in evaluations of students applying for their labs. Future committee service will change to focus more on recruiting of a more diverse set of students. In particular, recruiting female students to work in laboratories has proved challenging in the past and will be emphasized more in the coming years. I will contribute to this process by performing the recruiting tasks assigned to me and by providing input as conditions permit.

Citizenship duties also include interaction external to BYU. These I will participate in the peer-review process of manuscripts for journals in my area of expertise. I also will serve as a reviewer for grants proposals as opportunities arise. Participation in professional meetings are also important and I aim to participate in national and international meetings at least once annually and perform in a manner that reflects well on BYU and its goals.

**C. Relationship between my goals and departmental needs**:

By achieving my goals, the external visibility of the chemistry department will increase. Accomplishing these aims will simultaneously help me to become an integrated and valuable member of the chemistry department. By having regular interactions with my faculty mentors and department chair, I will be able to monitor my progress and adjust as needed.

**D. Resources needed to accomplish my goals**:

Success in my goals requires financial resources to set up my laboratory and time to perform the set up. Since joining the faculty, the chemistry department has generously supplies these resources by giving me a semester of teaching relief (Fall, 2019), by providing start-up funds and by providing a lab space suitable for my research. I am to oversee these resources in a manner that allows by laboratory to progress and become fully staffed and functional in the next two years. I will rely on by faculty research mentor and other colleagues with similar research needs as challenges arise and adjust these aims as needed.