

Faculty Development Plan

Faculty:

Department: Cell Biology and Physiology

Hire Date: July 1, 2023

Submitted: February 12, 2025

A. Strengths

At a previous institution I took the StrengthsQuest test. My top 5 strengths were:

- Analytical
- Strategic
- Individualization
- Achiever
- Focus

This strengths analysis suggest that I am a strategic thinker and executer of plans, which is balanced by a focus on building relationships and influencing others. While I certainly appreciate interpersonal dynamics between the instructor and students, and the need for nuanced approaches, my strengths can be used to build new programs and realize the highest aspirations of Brigham Young University.

In addition to these secular strengths, I have spiritual gifts and strengths that can be used and refined more within the environment of BYU. Through my eternal perspective, I can overcome setbacks and disappointments in research, which will help me run a steadier course to my life and work goals. That steadiness and calmness will be a strength to colleagues, and especially students, who may also face challenges of life. I am sensitive to the Spirit and can recognize its presence as it testifies of truth or nudges me to act or say things that can benefit others. I have an unwavering trust in Jesus Christ and His prophets. This faith is an anchor to my soul, making me sure and steadfast, always abounding in good works, being led to glorify God (Ether 12:4).

B. Professional Goals

Teaching		
	<u>Goals</u> <ul style="list-style-type: none">• To be a consistently caring professor who models Christlike attributes in and out of the classroom.• Embrace innovative approaches in teaching that promote active learning in the classroom.• Engage in curricular development at BYU.	<u>Plan of Action</u> <ul style="list-style-type: none">• Assess student ratings and comments after each semester.• Complete the reflection writing for teacher improvement in my teaching portfolio after each semester.• Respond to students' emails in a timely manner.• Share personal experiences to students so they can see the life of a faithful Christ-centered husband and father.• Build a spiritual environment in the classroom that invites revelation and the teaching influence of the Holy Ghost by praying before class and at the beginning of class and asking insightful questions and providing respectful feedback to answers.

		<ul style="list-style-type: none"> • Attend university teacher trainings and teacher development seminars at least once per semester. • Volunteer to help with medical school curricular development.
Scholarship		
	<u>Goals</u> <ul style="list-style-type: none"> • Actively mentor students in the lab and provide enriching and authentic research experiences that prepare them for the next stages of life. • Publish research articles that demonstrate the depth of impact of my research. • Obtain external grant funding that sustains a vibrant research environment. 	<u>Plan of Action</u> <ul style="list-style-type: none"> • Recruit 15-20 students that work on average 8 hours per week. • Publish >2 research articles and reviews per year that have significant contributions from students. • Apply annually for external funding that amounts to > \$50,000. • Support at least 4 students to attend a national conference per year to present their research.
Citizenship		
	<u>Goals</u> <ul style="list-style-type: none"> • To be a dependable committee member across department, college and university committee assignments. • Participate in community events that strengthen BYU and community partner relationships. • Engage in causes that highlight the unique light BYU has to offer to the world. 	<u>Plan of Action</u> <ul style="list-style-type: none"> • Attend 95% of assigned meetings and complete all assignments on time. • Support the partnership of BYU and Huntsman Cancer Institute by attending joint conferences and submitting collaborative grants. • Assist in planning, recruiting, and accreditation needs. • Continue to support the BYU 150th year celebration. • Support the BYU iGEM community through faculty mentorship and networking that becomes an annual tradition to submit a student team to compete.

C. Alignment of Professional Goals with University Expectations

One of the categories not explicitly stated above but is an important aspect of being evaluated for continued faculty status, is that of mentoring students. I will be mentoring students primarily throughout their experiential learning in the research laboratory, but any time a student comes through my office doors, I see that as opportunity to mentor or in other words minister to them.

2025 Update: One of my goals in scholarship was to actively mentor students in the lab and provide enriching and authentic research experiences that prepare them for the next stages of life. My plan of action to accomplish this goal was increase to 15-20 students that are working part time in the lab. Throughout the year 2024, I mentored 29 different students in my lab. I also mentored 14 separate students who worked in my lab on the iGEM project. I have also opened my lab to an entrepreneur team of 2 students who are developing an anti-cancer therapy. All of this is evidence that I am providing students with experiential learning opportunities. I am receiving feedback from several that it is helping them apply to graduate and professional schools.

Teaching: My primary teaching goals to be Christ-like in my interaction with students, and to create a spiritual environment that will demonstrate my ability to be bilingual in science as well as the spirit. My goal to seek constant improvement in my teaching methods is also aligned with the college to never abandon quality teaching or become complacent in teaching. The quest for improvement should translate into implementing best practices that should be reflected in the students' perception and through their ratings that overlap with typical ratings for the department faculty. The department needs me to teach 9-12 didactic credit hours plus mentoring courses per year, and I will ensure that I am always in that range for a teaching load. For the 2024-2025 academic year, I will be assigned 11 didactic teaching credit hours and several mentoring courses.

2025 Update: The didactic teaching for 2024 was a total of 11 credit hours and 301 students. My score ranges of uncertainty were from 3.9-5.0 with my 3.9 score coming in my first semester. By attending many teaching effectiveness seminars and responding to student feedback, I have implemented necessary changes that have led to higher student evaluation scores. Combing through the students' comments, one of my strengths is my respect and care for students and one of my weaknesses is my delivery of information. Additionally, I have had 27 students sign up for undergraduate mentored teaching, which has given course credit to students working in my lab.

Scholarship: My scholarship goals go above the minimum of 2 publications per year and an emphasis will be placed on student involvement in publications. I will strive to set up students to succeed so that they can deservedly receive that recognition. While the minimum for funding and grants is to just be actively applying for grants by submitting at least one proposal per year, I plan to submit enough to receive the funding for at least \$50,000 operational costs per year. The goal to support 4 students per year to attend and present at a national conference not only helps disseminate our research but provides an authentic research experience of presenting their work and networking with other scientists.

2025 Update: I published 3 peer-reviewed articles in 2024. Eight different BYU students were co-authors and if I count students from previous institutions, then the number of students that I mentor as co-authors on papers jumps to 15 total students. I value mentorship in research and seek to acknowledge them as often as I can. Students were very proactive in presenting their research at local and regional conferences. There were several redundant presentations at different conferences. I helped the iGEM team secure funding of \$29,000 and took a team of 5 students to compete at the international genetic engineering conference in Paris. Also, I was able to support one student who successfully obtained a Simmons Center Fellowship for \$9,600 for a summer internship at the University of Texas-Houston. I obtained an internal college seed grant of \$20,000 and applied for two external grants from the NIH and DoD for a total of \$376,952, but neither of the grants were funded.

Citizenship: For continued faculty status, the department expects that faculty should regularly attend department meetings and other service assignment meetings. Regularly is not well defined, but I had it explained by a senior administrator that 75% attendance is sufficient, I decided to aim for 95% attendance. However, more importantly than just showing up, when assignments are given, I want to be one of the most reliable at completing the assignments on time. There have been a number of exciting partnerships and developments since being hired in 2023, the two most notable being the building of a cancer center in Utah county by the Huntsman Cancer Institute and the onboarding of a new medical school. I have already demonstrated strong support for the cancer center and will volunteer my time and talents to the realization of both. Lastly, this year marked the inaugural launch of BYU iGEM, a student genetic competition. I plan to support this group from year-to-year as the faculty mentor. This will showcase the talents and the good that these students can do on the world stage solving real problems.

2025 Update: I have continued to support the department's curriculum committee and 4 graduate student committees. I have been helping with the sesquicentennial college planning committee and identified a great project that highlights the good that our department does to support the mission of BYU. I continue to support iGEM and the new relationship with the Crocker Foundation by attending weekly meetings to guide the student projects. Lastly, I have started attending and supporting the BYU school of medicine undergraduate

curriculum committee and I have been nominated to be on the university steering committee for curricular development. This is a time consuming committee assignment and with 3 hours per week of meetings to attend, it has been hard to achieve 95% attendance.

D. Resources Needed to Accomplish Goals

Teaching: To accomplish my goals of becoming an effective and compassionate teacher, I will take advantage of the consistent offering of teacher improvement courses offered at the college and university level. I will also solicit early feedback from my faculty mentor by inviting him to sit in on my lectures so he can provide suggestions on ways to improve. If there are resources available for hosting students for dinners or dessert at my house, then that would encourage me to expand my net for impact.

2025 Update: I will be submitting a \$500 teaching grant to support active learning strategies of poll surveys and flipped classroom discussions. The current version of Menti.com is free but limited in the number of participants and the number of surveys per month. By buying a license, I can use more polls and questions that promote active discussions and real-time assessments that students see as advantageous.

Scholarship: In the area of scholarship, I already feel very supported by the university and college that the costs for publishing are covered. The start-up package has been sufficient for my needs and the additional college and university funds for new faculty are resources I will continue to take advantage of to support research that will generate the preliminary data to go after larger external grants. To ensure successful grant scores, I need presubmission grant reviewers. My faculty mentor has already offered to be one reviewer, but I would need someone else with more of a cancer background to fully evaluate the scientific soundness of the proposal. Additionally, I could benefit from university resources to support student travel to defray the costs of attending national meetings and presenting research.

2025 Update: I have switched my focus from external collaborators and will draw upon the expertise of faculty here at BYU to go after a large foundation grant supported by AACR and the Mark Foundation. I will use the institutional resources to make sure the proposal is very competitive.

Citizenship: No resources needed.

E. Current Accomplishments

Teaching: In teaching, I have taught two sections of CELL 120. While my scores were not outside the typical ratings for this course, I was surprised by some of the comments on my teaching effectiveness and especially as it pertained to the BYU aim to be spiritually strengthening. I made a more concerted effort to teach and testify of gospel principles. In addition to these changes, I incorporated more active learning discussions about the subject material and administered a midcourse teacher evaluation and, predictably, I received higher scores from student ratings and the comments were stronger with less criticism. I have already reached out to the Life Sciences CTL consultant to learn about best practices of using comment classification tools to identify areas in the students' comments where I can improve my teaching. Mike Johnson and I have had several other conversations about effective teaching and using technology. I will continue to use him as a resource on how to improve my teaching.

Scholarship: In scholarship, I have built a research program with several different projects. Currently, 14 students are split into teams across 4 major projects revolving around cancer research. In a short time, I have established a hierarchy of students that promotes internal mentorship among them. The team leaders were chosen from the first semester in which I had 7 BYU students all working on one project. The project was completed and published in the peer-reviewed journal Current Oncology in April of 2024. I have submitted two collaborative external grants in the past 12 months. One to the NIH and one to the DoD. While neither one was funded, the DoD received promising feedback and is already resubmitted internally for another round.

Citizenship: In citizenship, I have been asked to serve on two committees: the department's curriculum committee and the college's sesquicentennial celebration planning committee. In addition, I have volunteered to serve as the faculty mentor for the BYU iGEM team. This has required 1-2 hours per week to meet with students and plan out experimental protocols and fundraising strategies to support a team of students to go to Paris and compete at the iGEM conference. This is currently a 14-member interdisciplinary team of undergraduate students. In the future, it will probably be capped at 10 students. Already there have been a number of initiatives to bring Huntsman researchers and BYU researchers together to start planning and building a foundation of collaboration. I have attended several of these meetings and presented my research at one and chaired a discussion section on bench research, highlighting all the good that BYU does in terms of cancer research. I look forward to continuing to build relationships with the folks at Huntsman and UVU as the new facility is planned and constructed.

F. Additional Comments

None

G. Mentoring Strategy

My mentoring strategy is based on the quote that "success is defined by going from failure to failure without a loss of enthusiasm". Biological research is hard and fraught with challenges and setbacks. I tell my students that while we strive for excellence, do not get discouraged with failures. When successes occur, we make a big deal to celebrate. Students are set up in teams and each team has a student leader. This provides opportunities for internal mentorship and is a self-sustaining strategy that allows me to focus on all aspects of my job and still feel productive in the lab. I am quick to recognize achievements and compensate students for their time in the lab with either a paid student position, publication authorship, course credit, letters of recommendation and/or real-world experience in a cancer research lab. We have weekly lab meetings to provide updates on projects, troubleshoot problems, or discuss current literature in our field and how it applies to our lab.

H. Equity, Diversity, and Inclusion

I value equity and a sense of belonging here at BYU. Every class begins with a prayer. I approach students before class to make sure they are comfortable saying the prayer that day, so it doesn't become an embarrassment. When discussing the advances in science and medicine, I explain that certain populations have been taken advantage of before and thus we need to be aware that there are vulnerable populations. I also discuss the need for more diversity in genetic databases so AI programs can be more accurate in predicting or modeling disease in minor ethnic groups.

Additionally, because I teach an introductory cell biology class that fulfills general education requirements, there are many students who are not a cell biology major or even in the life sciences. To make them feel welcome and that their input is valued during discussions, at the beginning of class I discuss a case study of a biotech startup that required input from engineers, businesspeople, lawyers, scientists, clinicians, and even artists to launch a successful medical device. This illustrates the need of an interdisciplinary approach to solve real-world problems.

I. Signature

I am committed to following this plan and the recommendations from my department chair to become the faculty that BYU needs me to become.

Course Development Project Report

Department of Cell Biology and Physiology

Course: **CELL120 Fall 2024**

1. Student Learning

The learning objectives are divided into two parts. There are course objectives that are universal across all sections of CELL 120 and then there are separate lecture objectives (see appendix) that correspond with a given unit or chapter. I share these learning objectives at the beginning of each lecture and stress that reviewing and knowing these learning objectives will be the content of their assessments. I encourage studying in small groups and for students to design their own questions to test each other in their knowledge and mastery of the material. Going forward, I will emphasize how different learning objectives fall within the overarching mission and aims of a BYU education which are to be spiritually strengthening, intellectually enlarging, character building, and lifelong learning and service.

The learning activities are lecture based with some actively learning activities added to each chapter topic (~1 for every 2 lectures). The students are invited to think/pair/share about disease case studies and graphs. We also have been using more Menti poll questions to assess learning and feelings about a given topic. We also implemented a game show style of win lose or draw that allowed students to show of their artistic side of various cellular processes and audience participants had to guess in a competitive manner what was being drawn.

The learning assessments are in the form of regular low stakes quizzes and 4 high stakes exams. Each multiple-choice question is directly tied to one of the lecture learning objectives. These assessments are administered through learning suite and the wrong and right answers have rationales to teach students. Students have access to all previous questions so they can build and learn from their mistakes. Students are scoring as a class in the 80% correct range and only a few questions have been modified or eliminated from the question bank due to their vagueness or difficulty. The assessments are demonstrating who is learning and mastering the material and who needs to work and improve their study habits.

One way to determine if students are engaged and interested in the subject material is their willingness and the quality of work that they put into completing extra credit assignments. These are often highlights for the students to apply concepts in class to theoretical situations that require research beyond the scope of the class. I have received numerous feedback from students that they enjoy the flexibility of digging deeper into an area that

was not deeply covered in class. I want students to enjoy the learning process and be inspired to go and look things up because they are curious.

2. Learning Environment

I value the relationships of a student and teacher and view my responsibility seriously to engender learning, respect, and revelation in the classroom. It hurts to read comments that student's faith was not strengthened in a class at BYU even if it is a science class. While still being authentic about my faith and who I am, I have tried to be more explicit about sharing spiritually strengthening things in my life. While the comments are reflecting an uptick in the spiritual side, I am still receiving scores that are lower than my colleagues in the same class. While I do not aspire to be better than them, I at least want to be on par with them. One drastic change was to teach the section on evolution in a new way, through a gospel lens. My first time teaching, I taught the textbook version, which probably came across as very secular. This past semester, I taught more gospel principles and bore my testimony of a Divine Creator and Overseer of creation, and I reserved the last 15 minutes of class for question and answers. The student comments highlighted this change and loved my gospel perspective.

In addition to the value of relationships, I strive to create a setting that promotes learning and does not distract. One of my strengths as highlighted by student reviews is my ability to respond to students respectfully. As noted by students, I took time to respond to questions both in and out of the classroom. I did not judge or criticize but encouraged questions and even different viewpoints in a respectful way. Students felt very comfortable asking questions and they knew that I cared about their well-being and success in the class and in life. I tried to be very accommodating to students with disabilities or individual circumstances that interfered with learning or turning in assignments.

The materials that are used in class are readily accessible. There is no emphasis on a particular race good or bad. In fact, we had a young lady from Iraq that is the first native Iraqi to serve a mission from her country for the church. I gave her an opportunity to tell her story in front of the class to strengthen others and demonstrate that you don't have to be a white Utah member to fit in and find joy in the Gospel and at BYU.

3. Processes of Improvement

My first time teaching the course was in Winter of 2024. While I started off strong, as the semester progressed, I relied on the material of the textbook to guide the conversation, and lectures became more lecture based and not as engaging and that was reflected in students' comments. This semester, I have made a commitment to provide more discussion between students and in class problem solving that stimulates active learning. I am committed to have at least one break out session per lecture.

In addition to introducing more active learning styles of problem solving and discussion-based classes, I want students to know that they can receive revelation and learn truths about the gospel and science that are compatible. As before, I am committed to starting every class with a prayer. As we discuss the scientific method, I relate the steps of making observations, asking questions, and testing a hypothesis to finding spiritual truths. I have asked my students to write a half page paper about how they follow the prophet's admonition to think celestial in a cell biology class. After attending University Conference, I am committed to testifying of the prophet and the Book of Mormon and using its teachings whenever I can in class.

Based off the feedback from students from the winter semester, I will lean more into the uniqueness of BYU and testify of spiritual truths. I will engage the students in more active discussions. I will communicate my expectations clearly and in a timely manner. With a class of 175 students, this going to be a challenge, but I have set the goal to give timely feedback to assignments and emails.

4. Appendix of Learning Objectives

1. Think critically about the purposes and objectives of scientific studies and data.
2. Become observant of and curious about patterns and processes in living things.
3. Ask essential, specific, answerable questions about observations.
4. Form hypotheses about biological patterns and processes that are testable.
5. Understand how proper experimental design fits into the scientific method
6. Learn the key aspects for controlling experiments that lead to more solid hypothesis testing
7. Identify flaws in experimental design that can lead to unconscious or implicit bias
8. Discuss and critique experimental designs in current research
9. Differentiate between types of scientific data
10. Differentiate between scientific accuracy and scientific precision
11. Identify possible sources of experimental error
12. Explain variation in data analysis and how that impacts our interpretation
13. Explain the importance of working with data that is normally distributed
14. Describe what a p value represents and what it means to be < 0.05
15. Appreciate the aesthetic presentation of data for quick and accurate interpretation
16. Understand the basics of macromolecule synthesis and catalysis (breakdown)
17. Describe the structures and purposes of carbohydrates, lipids, and proteins
18. Explain the relationship between DNA, RNA, and protein and how information is translated from one macromolecule to the next
19. Detail how DNA, RNA and protein dictate the shape and function (identity) of a cell
20. Understand different methods for observing cells and their different structures
21. Describe the differences between eukaryotic cells and prokaryotic and name examples of each
22. Detail the location and function of the following cellular organelles: nucleus, plasma membrane, cytoskeleton, mitochondria, ribosomes, endoplasmic reticulum, Golgi apparatus, lysosomes

23. Understand the means whereby cells communicate with and connect with their external environment and neighboring cells
24. Describe the fluid mosaic model of the cell membrane
25. Describe how phospholipids, proteins and cholesterol contribute to membrane fluidity and rigidity
26. List the functions of membrane-bound proteins
27. Understand the difference between passive diffusion and active transport
28. Define osmosis and the role that aquaporins play in the transport of water across the plasma membrane
29. Describe the process whereby cells can establish an electrochemical gradient of Na^+ and K^+
30. Understand the different mechanisms whereby a cell will actively import and export bulk items
31. Define cellular metabolism and understand the differences between catabolic and anabolic pathways
32. Describe the different forms of energy
33. Explain how changes in free energy impacts chemical reactions within a cell and how catalyst can change free energy needs
34. Differentiate between exergonic reactions and endergonic reactions
35. Understand how cell metabolism is a multistep open system enabling continuous work
36. Describe how ATP provides energy for reactions and how catalysts speed up reactions
37. Describe how metabolic pathways are tightly controlled
38. Conceptualize that cell signals can come from inside the cell, neighboring cells, distant organs or external factors
39. Describe the three stages of cell signaling
40. Know what a ligand is and its function
41. Differentiate between GPCRs, RTKs, Ligand-gated Ion Channels, and Hormone receptors
42. Understand the advantages of a signal transduction cascade
43. Describe the mechanisms whereby cAMP and Ca^{2+} are used as second messengers
44. Describe the four aspects of signal transduction
45. Understand that cell signaling can result in cell death called apoptosis
46. Understand the purpose of cell division
47. Describe the general structure of chromosomes
48. Describe the steps of the cell cycle
49. What happens during interphase?
50. What happens during mitosis and cytokinesis?
51. Identify the controls in place to prevent uncontrolled cell division
52. Describe what happens when control mechanisms are impaired
53. Differentiate between Meiosis and Mitosis
54. Define terms such karyotype, autosomal and sex chromosomes, diploid and haploid cells
55. Describe what is crossing over and why it is important
56. Describe the chromosome theory of inheritance
57. List the types of genetic model organisms

58. Understand sex-linked genetic inheritance and how males exhibit more phenotypes with recessive alleles
59. Define a Barr body and how random x inactivation leads to mosaicism in females
60. Identify the opportunities of targeting unique chromosomal structural mutations
61. Describe genomic imprinting and compare to sex-linked inheritance patterns
62. Know the unique inheritance pattern of mitochondrial DNA
63. Understand the history of discovery behind the DNA double strand helix
64. Describe the molecular differences between the leading and lagging strand of DNA synthesis
65. Differentiate the process of telomere replication from the normal DNA synthesis
66. Describe how mistakes in DNA synthesis leads to genetic variety allowing for natural selection to select the most favorable traits
67. Know the composition of the nucleosome
68. Differentiate between euchromatin and heterochromatin
69. Know the steps of transcription
 - Initiation, elongation, termination
70. Differentiate between DNA polymerase and RNA polymerase
71. Understand how codons are important for translating RNA into amino acids
72. Describe the post transcriptional processing of mRNA to become mature mRNA
73. Understand how alternative splicing results in increased protein diversity
74. Describe the process of translation
75. Describe how mutations in DNA translate to phenotypic differences in organisms and can cause harmful effects (disease) or benefits that enable survival advantages
76. Know the differences between repressor and inducer operon systems in bacteria
77. Understand how chromatin structure is modified to regulate gene expression
78. Know the function of transcription factors and enhancers and how they regulate gene expression
79. Describe how proteins and mRNA are further regulated after synthesis to control expression levels
80. Know the different types of non-coding RNAs and their functions in gene expression and regulation
81. Describe the structure and function of a virus
82. Know the major classifications of a virus
83. Understand how a virus replicates
84. Describe how viruses cause disease or pathogenicity
85. Differentiate prions from viruses
86. Know the different techniques for analyzing cellular molecules (e.g. DNA, RNA, protein)
87. Understand how nucleic acid can be manipulated via
88. Restriction enzymes
89. Crispr-Cas9
90. Differentiate DNA amplification methods (PCR vs Bacterial Cell Cloning)
91. Appreciate the use of stem cell technologies and the need for regulation
92. Enumerate the societal benefits of DNA technologies
93. Understand how DNA technologies have helped advance our knowledge of genomes and how they are related and different across species
94. Appreciate the number of resources available to annotate genes and proteins and their functions

95. Describe what gene density is and its relationship to genome size
96. Describe how genomes can change, adding diversity to a species' genome
97. Know what comparative genomics teaches us about the relationship of species
98. Understand that cancer is not a singular disease
99. Identify different cancer types and the normal cells from which they arise
100. Identify what causes cancer and the genetic mutations that give rise to cancer
101. Recognize the different hallmarks of cancer
102. Describe what personalized medicine is in oncology and list specific examples of how this achieved
103. Recognize mechanisms of resistance that cancer uses to survive

Scholarship Development Project Final Report

Department of Cell Biology and Physiology

Research Focus: **Cancer Pharmacology**

Scholarship		
	Goals <ul style="list-style-type: none">• Actively mentor students in the lab and provide enriching and authentic research experiences that prepare them for the next stages of life.• Publish research articles that demonstrate the depth of impact of my research.• Obtain external grant funding that sustains a vibrant research environment.	Plan of Action <ul style="list-style-type: none">• Recruit 15-20 students that work on average 8 hours per week.• Publish >2 research articles and reviews per year that have significant contributions from students.• Apply annually for external funding that amounts to > \$50,000.• Support at least 4 students to attend a national conference per year to present their research.

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To accomplish these goals, I will elaborate on the bulleted plan of action items. It is not difficult to increase the number of students. There is no shortage of students that are seeking research experiences. However, I learned through the spring seminar the importance of finding the right students and the right ratio of students so that their experience is not diluted by the number of students that need mentoring in the lab. In addition to a stellar graduate student that helps keep the lab running and students trained, I will create a student position that is the lab manager. This person will take some of my administrative duties so I can focus more on mentoring students. I am also setting up an additional small team meeting for students and establishing a rotation among the 6 teams so that only 2 teams present at each lab meeting instead of short condensed weekly reports that were in practice.

To publish >2 research articles and reviews per year, I will implement a concept taught during the spring faculty seminar series of carving out writing time. I am going to set aside 4 1-hour blocks in my calendar that are devoted to writing scientific papers and grants. This will keep the ball rolling on a number of projects and instead of waiting until the last minute and writing in exhausting bulk periods, I will break it down into more manageable pieces. I will also assign more writing to my students to get them involved in the process.

To increase funding rates, I will seek outside peer review early in the process. One of my weaknesses is waiting too close to the deadline to complete the application and submitting it without peer input. I will set a personal deadline of 1 month prior to the application deadline to finish the proposal document and submit to my faculty mentor and colleagues in the Simmons Center for Cancer Research.

For each grant, I will specifically request funding for students to travel to national conferences. Students that have recently published or close to publishing will be rewarded for making significant research contributions.

Analysis of 2024 Research/Scholarship Goals

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Publications

Blue = BYU students

1. Fatema K, Wang Y, Pavak A, Larson Z, Nartker C, Plyler S, Jeppesen A, Mehling B, Jones K, **Barrott JJ**. piggyBac mutagenesis identifies an interplay between ARID1A deficiency and genomic instability in aggressive osteosarcoma. *Cancers (Basel)*. 2024 Jul 31;16(15):2725.
2. **Okojie J**, O'Neal N, **Burr M**, **Worley P**, **Packer I**, **Anderson D**, **Davis J**, **Kearns B**, Fatema K, Booker D, Dixon K, **Barrott JJ**. DNA quantity and quality comparisons between cryopreserved and FFPE tumors from matched pan-cancer samples. *Current Oncology*. *Curr Oncol*. 2024 Apr 28;31(5):2441-2452.
3. Pozner A, Verma S, Li L, Wang S, **Barrott JJ**, Nelson M, Yu J, Negri GL, Colborne S, Hughes C, Zhu J, Lambert S, Smith-Fry K, Stewart M, Kannan S, Jensen B, Li J, Vahrenkamp J, Groundland J, Wustrack R, Gertz J, Zhang X, Lazar A, Hirst M, Morin G, Nielsen T, Shen P, Jones K. ASPSCR1-TFE3 reprograms transcription by organizing enhancer loops around hexameric VCP/p97. *Nature Communications*. 2024 Feb 7;15(1):1165.

Grants Submitted

1. Identification and characterization of novel CDK11 inhibitors in osteosarcoma. Department of Defense for \$34,210.
2. Lipid droplet microarrays for miniaturized phenotypic screening of drug efficacy on patient-derived cancer cells. National Institutes of Health for \$342,741.

I have created an executive team within the lab that consists of Jeffrey Okojie, PhD graduate student, DeLaney Anderson, an undergraduate student who serves as the lab manager, and me. The addition of DeLaney and empowering her to make decisions and to be a source of communication and organization has helped free up my time for more mentoring and less time doing administrative meeting organization, ordering

supplies and being a point of contact with vendors for products and maintenance of equipment. This has also freed up time for Jeffrey to focus more on his dissertation research project. Other students are appreciative of how organized lab meetings and one on one or small group meetings are, and DeLaney is enjoying the new perspective of seeing how a lab operates. I was also able to send her to a national conference in Pittsburgh last November to represent the lab and add a presentation at a national conference to her CV.

I was able to send DeLaney to a national conference in Pittsburgh and Jeffrey attended a national conference in Houston. I took 5 students with me to Paris to compete at the iGEM conference on synthetic biology. All students performed admirably with their presentations and the iGEM team was awarded a silver medal for their efforts. I have accomplished my goal of supporting conference travel and presentations and in 2025, I hope to support more at regional, national and international conferences.

To increase productivity in writing, I have started coming in early on Tuesday and Thursday mornings. I am using that time to write grants and manuscripts to support the lab. That is only two hours of designated writing time, but it appears to already be paying dividends as my goal for 2025 to publish peer-reviewed manuscripts is 5 with one already under review and two more that will be submitted by the end of the winter semester. Additionally, I have implemented a new format to my weekly journal club that involves greater student participation in reading and writing summaries of their readings so that we can have a comprehensive review on the topic of Arid1a mutations as a mechanism to drive cancer progression. Each week students are given a prompt question, and they are invited to research an article that answers the question and share data and a writing summary about the article. This has led to more engaged discussions and accountability for preparing and contributing to the growing document of information on the subject. We plan to submit the review article also at the end of the semester for peer review. I currently have nine students participating in this writing activity.

The grants that were submitted in 2024 were collaborations with scientist at Idaho State University and Florida State University. In 2025, I want to emphasize the strengths that exist at BYU and with our future partners in cancer research, the Huntsman Cancer Institute. I have submitted two Simmons Center Cancer Research grant proposals to support students for a summer fellowship for a total of \$20,000. These students will work with collaborators in the Utah Cancer research network that will lead to larger grants submitted from multiple institutions in Utah. Furthermore, I am targeting a large foundation grant from AACR and the Mark Foundation that supports clinical applications for cancer detection. We have the expertise in the Department of Cell Biology and Physiology to submit a competitive and innovative research proposal. Regardless of the outcome from this proposal, it will encourage writing and collaborations between 4 faculty at BYU that have the potential to do some exciting work in the space of cancer detection.

I will continue to seek synergistic collaborations and nurture the relationships that are needed to submit and conduct large competitive grants.

Citizenship Development Goals

Department of Cell Biology and Physiology

Academic Rank: **Associate Professor**

Citizenship		
	<p><u>Goals</u></p> <ul style="list-style-type: none">• To be a dependable committee member across department, college and university committee assignments.• Participate in community events that strengthen BYU and community partner relationships.• Engage in causes that highlight the unique light BYU has to offer to the world.	<p><u>Plan of Action</u></p> <ul style="list-style-type: none">• Attend 95% of assigned meetings and complete all assignments on time.• Support the partnership of BYU and Huntsman Cancer Institute by attending joint conferences and submitting collaborative grants.• Assist with the establishment of the newly announced BYU medical school by participating in planning, recruiting, and accreditation needs.• Continue to support the BYU 150th year celebration.• Support the BYU iGEM community through faculty mentorship and networking that becomes an annual tradition to submit a student team to compete.

For continued faculty status, the department states that faculty should regularly attend department meetings and other service assignment meetings. Regularly is not well defined, but I had it explained by a senior administrator that 75% attendance is sufficient, I decided to shoot for 95% attendance. However, more importantly than just showing up, when assignments are given, I want to be one of the most reliable at completing the assignments on time. There have been a number of exciting partnerships and developments since being hired in 2023, the two most notable being the building of a cancer center in Utah county by the Huntsman Cancer Institute and the onboarding of a new medical school. I have already demonstrated strong support for the cancer center and will volunteer my time and talents to the realization of both. Lastly, this year marked the inaugural launch of BYU iGEM, a student genetic competition. I plan to support this group from year-to-year as the faculty mentor. This will showcase the talents and the good that these students can do on the world stage solving real problems.

I will specifically work with collaborators at HCI named: Dr. Gupta, Dr. Jones, and Dr. Whelm to do projects and submit grants. I also will work with Dr. Rossi at UVU as part of a community effort to work together to better understand cancer. I will work closely and follow the lead of my department chair to support the planning and execution of starting the new medical school. Lastly, to support iGEM in the future, I will strengthen the connections recently established with the Crocker Foundation and the Ballard Center.

Analysis of 2024 Citizenship Goals

While my goal was to attend 95% of meetings, I had too many conflicting meetings that prevented that high of attendance. However, it was greater than 75%.

I have continued to support the department's curriculum committee and 4 graduate student committees. I have been helping with the sesquicentennial college planning committee and identified a great project that highlights the good that our department does to support the mission of BYU. I continue to support iGEM and the new relationship with the Crocker Foundation by attending weekly meetings to guide the student projects. Lastly, I have started attending and supporting the BYU school of medicine undergraduate curriculum committee and I have been nominated to be on the university steering committee for curricular development. This is a time-consuming committee assignment and with 3 hours per week of meetings to attend, it has been hard to achieve 95% attendance.

My goal is to communicate with the chairs of various committees, so they understand the constraints on my time and realize that absence does not equate to indifference. The new citizenship responsibilities in supporting the new school of medicine and the iGEM Crocker fellowship program are two major time commitments. In hindsight, it probably would have been wise to only participate in one, but it is easy to support and find the time when I feel so passionately about both programs.

I have been able to nurture the collaborations with Dr. Jones and Dr. Rossi through external research collaborations by submitting BYU support for students to conduct cancer research in their labs during the summer. Also, I was able to host Dr. Jones for a departmental seminar that he gave during the Fall semester. It was very well attended, and he made quite an impression on the students and faculty here on campus.

Course Development/Teaching Grant Proposal

One tool that would facilitate active learning in the classroom with a large group of students is through online polling software called Mentimeter. It allows for real-time student feedback and formative assessment of concepts taught in class. In addition to polls, it can facilitate quizzes and interactive word clouds that foster engagement. I was exposed to this method during my teacher training, and I really enjoyed the engagement, and I know the students will too. The anonymity will encourage shy students to participate. I propose using funds to upgrade from the free subscription model that only allows 50 participants per month to unlimited participants per month. That way I can use the polling technique as frequently as I would like, which ideally would be every class. The cost to upgrade to the basic subscription is \$11.99 per month and they bill once per year so a total of \$143.88. I would like to upgrade for two years.

The other aspect of delivering high quality lectures for a flipped classroom or for when I travel requires clean, clear audio. To enhance the delivery of these prerecorded lectures, I would like to purchase a mini microphone accessory called the Super Mini Wireless Lavalier Microphone on Amazon. The cost for this microphone system is \$99.99. My demands to attend conferences and support students at international science competitions has increased. As such, I want to make sure students are having a great experience with the content and recorded lectures. This will also provide opportunities to adopt some of the practices that I have learned from Tim Jenkins who also teaches CELL 120 about the efficacy of flipped classrooms.

The total proposal would only be \$387.75. If the full \$500 is allotted I would put the remaining amount towards a 3rd year subscription to Mentimeter polling software.