
SAMPLE Faculty Development Plan

Electrical and Computer Engineering Department
Brigham Young University
July 30, 2019

The purpose of the faculty development plan is to help with determining goals to achieve my full potential as a faculty member at BYU. It will help with setting expectations between my department and myself and allow me to track my process throughout my CFS track. It will act as a blueprint for the start of my career. The plan has three sections: scholarship, citizenship, and teaching. Within each section, I assess my strengths and weaknesses and give goals and plans.

SCHOLARSHIP

SELF-ASSESSMENT

Thinking about how to be successful here at BYU, it became evident that I need to build good habits around writing. For me, writing has not been my favorite activity and something I typically procrastinate. To solve this problem, I plan on scheduling daily writing times. This will get me into the habit of writing daily and allow me to write papers and grant proposals quicker. The other thing that stood out to me when thinking about how to be successful at BYU is attracting good students to help with research. To help with this, I want to increase my visibility within the department. Teaching undergraduate classes will help with this, but I also want to develop exciting demos to show undergraduate students and get them excited about my research.

The department's expectations for scholarship are that my intellectual contributions have the potential for substantial impact on my discipline. To achieve this, I must demonstrate the ability to sustain at least two high-quality peer-reviewed products per year.

GOALS AND PLANS

- Write for at least one hour every day weekday. This will ensure that I have time to work on publications and grant proposals.
- Submit three papers every year.
- Submit three grant proposals every year.
- Attract high-quality students by keeping my lab's website up-to-date and highlighting exciting research on it. Also, promoting my research by developing impressive demos to show undergrad students.
- Stay current with research by reading two papers a month on current research from top conferences in my area (MobiCom, MobiSys, WiSec, Sensys, IoTDI, etc.)

CITIZENSHIP

SELF-ASSESSMENT

I believe that I have much to contribute to the department and research community. Being a new faculty member, I do not have much experience in this area. I am anxious to become actively involved with my research community and start to contribute positively.

The department expects high-quality citizenship both within the department and professionally. Within the department, this involves serving willingly on a committee assigned by the department chair. For professional citizenship, the expectation is that I help with conference planning committees and as a reviewer.

GOALS AND PLANS

- Have regular meetings with my mentor.
- Actively participate as a member of the undergraduate committee.
- Become involved with IEEE student meetings. To fulfill this goal, I would like to organize a demo for the IEEE meeting related to my research. This will help students understand what is possible and get them excited about research.
- Become part of a TPC member of a conference (MobiCom or an IoT related conference).
- Become more involved with air quality and exposure health communities. There are three ways I plan on achieving this. First, the annual "Air Quality: Science for Solutions" conference is being held at BYU next year, and I plan on helping to organize this event. Second, I will write proposals to air quality related grants. Third, I will become part of the "Center of Excellence for Exposure Health Informatics" at the University of Utah.

TEACHING

SELF-ASSESSMENT

Coming straight from my PhD and having never taught a class before I came to BYU, I was worried about teaching. My first class was a lot of work, but it was a positive experience. From that experience, I feel more confident in my teaching ability. I will continue to find ways to improve my teaching, as described below. For Fall 2019 Semester, I will be team-teaching a large junior level class. This will give me experience teaching a larger class and allow me to learn from an experienced teacher.

The department's teaching expectations are that I actively improve my teaching over time and that I mentor and advise undergraduate and graduate students.

GOALS AND PLANS

- Receive regular feedback from students. This involves getting feedback after each lab. This will help me understand how long students are taking on labs, what the possible pain points might be, and any other feedback the students offer. I also plan on doing mid-semester reviews to see if there is anything I can do to improve. I will also carefully read student feedback at the end of the semester, identifying themes and lessons I can learn from the feedback.
- Attend the college teaching and learning seminars. This will help me learn new ways to improve my teaching and interactions with students.
- Keep a teaching journal of ideas I want to try and things I have tried and how they have worked. My plans for improvement will be fueled by the college's Teaching and Learning meetings.
- Make classes more interactive with small evaluations during class (e.g., in-class quizzes).

- Advise undergraduate students through the IMMERSE program.

Course Development Project

Electrical and Computer Engineering Department

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In Winter 2019, I taught ECE 522R, Intro to Wireless Networking. This is a course that I developed myself. First, it covers the basic principles of networking and wireless signals. We then go into detail about the features of WiFi, focusing on security, reliability, fairness, and routing. After doing an in-depth study of WiFi, we look at other wireless protocols, such as Zigbee, Bluetooth Low Energy, and LoRa, and how these protocols compare to WiFi. By doing so, I can highlight different design decisions made by each protocol and how that relates to the security, reliability, fairness, and routing.

I designed the class for graduate students, so it focuses on having the students read research papers, synthesize the information they learned, and clearly relay that information, through written reports and presentations. Students also have a semester-long project where they are expected to discover a problem on their own (relating to wireless networks) and come up with a solution. For my project, I will be developing this course.

GOALS

I will be teaching this class again in Winter 2020. Based on my experience with teaching this class, I have developed the following goals:

- Receive regular feedback from students. In my first semester of teaching, I felt like I could have done a better job of understanding what students thought about the assignments and labs I gave. For example, I would like to know how long it took them to complete the assignment or lab, what are things they struggled with, what are things that they learned. This time teaching, I plan on asking students for their feedback at the end of each lab assignment. I also plan on doing mid-semester reviews to see if there is anything I can do to improve.
- Make classes more interactive with small evaluations during class (e.g., in-class quizzes). During some of the lectures, I felt like students were not as engaged as they could have been. To help improve engagement, I plan on having small low-stake quizzes during class.
- Keep better notes of feedback I get and lessons learned. Throughout the semester of teaching, there are things I learned, such as what example problems did not work or what concepts students found confusing. This semester, I would like to do a better job of recording those pain points (or successes) so that I can better learn from my experience.

SYLLABUS

The syllabus for this class is included in the following pages.

ECEn 522R: Introduction to Wireless Networks

Tuesday and Thursday, 12:05 PM to 1:20 PM, 490 CB

Instructor

801-422-0734
450J EB

Office Hours

T, Th 1:20 PM to 2:30 PM
(or by appointment)

Prerequisites

None required

Course Description

Wireless networks have become an indispensable part of our daily lives, and constant wireless connectivity of some kind is almost ubiquitous. This constant connectivity, along with the availability of cheaper and smaller wireless devices, has opened up new applications that were not possible before. The wireless networks these devices use poses a different set of challenges and opportunities in comparison to wired, stationary networks. In this course, we will cover general principles and practices of wireless networks, including design, implementation, protocols, and applications. In particular, we will focus on WiFi, Bluetooth Low Energy (BLE), Zigbee, and LoRa. *The concepts taught in this class will be strengthened by reading academic papers, homework questions, lab assignments, a group paper review, a midterm exam, and a final project.*

Course Objectives

Give students an understanding of the fundamentals of wireless networking. Students will be able to understand the challenges of wireless networks compared to wired networks.

Teach students how every networking protocol (wireless or wired) has to address security, reliability, fairness, and routing. Students will be able to identify these four principles in all networking protocols.

Help students understand the trade-offs made between different wireless networks. Students should be able to understand the design decisions of a wireless protocol and why the protocol designers made that choice.

Materials

For the course, we will be using material from many different books. The only book I will require you to read part of is "802.11 Wireless Networks: The Definitive Guide, 2nd Edition". This book is available online through Safari Books for free for students. Other than this book, students can use slides from class for reference.

The following books are a useful reference for the material we will be covering in this class.

For general computer networks:

- *Computer Networking: A Top-Down Approach, 7th Edition* by Kurose and Ross. This book is great, and you will not regret buying it. If you are thinking of a career in networking, then this book is a must-have. I reference it often in my own research.

For wireless communications:

- *Wireless Communications Networks and Systems*, by Beard and Stallings
- *Wireless Communications, 2nd Edition*, by Molisch

Grades	<p>Homework questions and reading summaries: 15%</p> <p>Labs: 15%</p> <p>Class participation: 10%</p> <p>Group Paper Review: 10%</p> <p>Midterm Exam: 20%</p> <p>Course Project: 30%</p> <p>Late Assignments For an assignment that is one day late, you get 80% credit. For an assignment that is two days late, you get 50% credit. You receive no credit if your assignment is more than two days late. If you are sick or have another valid reason, no deductions will be taken <i>if you let me know before the assignment is due.</i></p>
Assignment Descriptions	<p>Academic Papers Throughout the class, you will read academic papers published in top conferences and write a short summary and review. This will allow you to learn about cutting-edge research and gain the experience of reading and processing academic papers—this is an important skill.</p> <p>Homework Questions At the end of each unit of the class, there will be homework questions related to that topic. This will help you to understand how well you understood the material and prepare you for the exam.</p> <p>Labs Labs allow you to get hands-on experience with networking. It is essential to take the principles you learn in class and apply it to practical applications.</p> <p>Group Paper Review A group of three students will pick a recently published research paper related to wireless networking and read/review the paper together. The group will then present this paper to the class. The goal of the group paper review assignment is to gain more experience in reviewing a paper and presenting your review. It is beneficial to discuss papers as a group to get a better understanding and hear other's perspective. We will discuss this assignment in more detail later in the semester.</p> <p>Final Project The final project will be an accumulation of all of the different principles you have learned in the class and applying it to a problem that you find interesting. Groups of two students will find an interesting question or idea related to wireless networking and explore it. The goal of the course project is to get real experience with wireless protocols. You will do this by building, measuring, experimenting with the wireless protocols around you. We will discuss this project in more detail later in the semester.</p>
Schedule	<p>This course consists of four different parts:</p> <p>Basic Networking For the first month, we will cover networking basics. This will include the Internet stack (HTTP, TCP, IP), socket programming, and network design considerations.</p> <p>Wireless Signals We will briefly cover the fundamentals of wireless signals. This will include things like wireless propagation, loss characteristics, multipath, modulation schemes, etc. This will give everyone a basic understanding of the challenges when dealing with wireless signals.</p> <p>WiFi We will spend the majority of our time studying WiFi. Since WiFi is so popular and widely deployed, it is a good protocol to study. We will examine its design and trade-offs. We will look at how it deals with security, reliability, fairness, and routing. We will also explore the problems wireless protocols have to deal with compared to wired protocols.</p> <p>Other Protocols In the final section, we will look at other wireless protocols, such as Zigbee, Bluetooth Low Energy, and LoRa. We will compare these protocols to WiFi to see the various trade-offs that are made. This will give us insights into how wireless protocols are designed.</p>

Participation and Attendance Policy

This is a graduate student level class, and I expect graduate-level participation and attendance. I expect all students to come to every lecture and be engaged in the lecture. When you are in a lecture, I expect your attention, so students should not be on their phones or doing non-class related things on laptops.

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.

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.

Preventing 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 or (801) 422-8692. Reports may also be submitted through EthicsPoint at <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> or by contacting the university's Title IX Coordinator.

**Academic
Honesty**

The first injunction of the Honor Code is the call to "be honest." Students come to the university not only to improve their minds, gain knowledge, and develop skills that will assist them in their life's work, but also to build character. "President David O. McKay taught that character is the highest aim of education" (The Aims of a BYU Education, p.6). It is the purpose of the BYU Academic Honesty Policy to assist in fulfilling that aim. BYU students should seek to be totally honest in their dealings with others. They should complete their own work and be evaluated based upon that work. They should avoid academic dishonesty and misconduct in all its forms, including but not limited to plagiarism, fabrication or falsification, cheating, and other academic misconduct.

Plagiarism

Intentional plagiarism is a form of intellectual theft that violates widely recognized principles of academic integrity as well as the Honor Code. Such plagiarism may subject the student to appropriate disciplinary action administered through the university Honor Code Office, in addition to academic sanctions that may be applied by an instructor. Inadvertent plagiarism, which may not be a violation of the Honor Code, is nevertheless a form of intellectual carelessness that is unacceptable in the academic community. Plagiarism of any kind is completely contrary to the established practices of higher education where all members of the university are expected to acknowledge the original intellectual work of others that is included in their own work. In some cases, plagiarism may also involve violations of copyright law. Intentional Plagiarism-Intentional plagiarism is the deliberate act of representing the words, ideas, or data of another as one's own without providing proper attribution to the author through quotation, reference, or footnote. Inadvertent Plagiarism-Inadvertent plagiarism involves the inappropriate, but non-deliberate, use of another's words, ideas, or data without proper attribution. Inadvertent plagiarism usually results from an ignorant failure to follow established rules for documenting sources or from simply not being sufficiently careful in research and writing. Although not a violation of the Honor Code, inadvertent plagiarism is a form of academic misconduct for which an instructor can impose appropriate academic sanctions. Students who are in doubt as to whether they are providing proper attribution have the responsibility to consult with their instructor and obtain guidance. Examples of plagiarism include: Direct Plagiarism-The verbatim copying of an original source without acknowledging the source. Paraphrased Plagiarism-The paraphrasing, without acknowledgement, of ideas from another that the reader might mistake for the author's own. Plagiarism Mosaic-The borrowing of words, ideas, or data from an original source and blending this original material with one's own without acknowledging the source. Insufficient Acknowledgement-The partial or incomplete attribution of words, ideas, or data from an original source. Plagiarism may occur with respect to unpublished as well as published material. Copying another student's work and submitting it as one's own individual work without proper attribution is a serious form of plagiarism.

Teaching Grant Proposal

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As part of my course, I have a semester-long project where the students experiment with the wireless networks around them. Many of the projects would be enhanced by having some amount of specialized hardware. For example, it can be challenging to capture the communication between two Bluetooth devices to analyze the protocol, but if you have equipment designed for that purpose, then it becomes much easier. With the \$300 grant, I would like to buy supplies for my students to use for this project. In particular, I would like to buy a Bluetooth sniffing device called Ubertooth One (\$115), two LoRa communicators called LoStik (\$46 each), and a software-defined radio called ADALM-PLUTO (\$99). This would give students the option to explore the wireless protocols in new ways for the course project that were not possible before. Students would borrow the equipment during the semester to do their course project and return it to me when the semester is over.

Scholarship Strategies Project

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I currently have two major areas of focus for my research. The first is long-range, low-power air quality sensor deployments. This will build on my previous work of deploying air quality sensors in the home. I am looking to extend my work to deploying sensors in locations where it is not easy to measure air quality. I am interested in finding collaborators to provide new applications for this technology. The second area of focus is a new protocol I developed called on-off noise power communication. I recently published on this technique, which extends the range of WiFi. I am looking for new applications for this technology. I am currently looking at applying machine learning to make my method more robust. Other areas of focus are adding security and privacy to the technique and extending it to other wireless protocols.

I have published on both of these areas and would like to continue to build on them. Both of these topics are big enough that there are plenty of things to do. My research tends to be towards building large systems and discovering problems that can be researched and solved. To extend this work even further, I would like to accomplish the following:

- Add machine learning to ONPC and publish the results.
- Build a new long-range, low-power air quality sensor and deploy it.
- Find collaborators for my air quality research.

To accomplish these goals by February 2020, I would like to employ the following strategies to make me more productive:

- Build habits for successful scholarly writing.
Goal: Write for at least one hour every day weekday. This will ensure that I have time to work on publications and grant proposals.
Evaluation: I will keep track of the time I worked and what I accomplished (e.g., words written, projects worked on).
- Stay current with state-of-the-art research and become more expert in my field
Goal: Read two papers a month on current research from top conferences in my area (MobiCom, MobiSys, WiSec, Sensys, IoTDI, etc.)
Evaluation: Keep track of what papers I read by summarizing the papers and writing how I can apply the things I learned to my research.
- Get students involved in my research.
Goal: Have a student submit a research paper to a conference.
Evaluation: Keep track of the progress of the paper and work with the student to complete the paper.

Citizenship Project

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For my citizenship project, I plan on helping to organize the “Air Quality: Science for Solutions” conference, which will be taking place next year at BYU. This is an annual conference where air quality researchers and government officials from all over the state come together to share ideas, research, and results. The conference usually consists of 150 people from all over Utah. Last year I participated in the conference by presenting a poster and being a judge for the poster session.

Helping to organize this conference would give me experience in organizing such events. It would also help me to get more involved with the air quality research community in the state. This aligns well with my faculty development plan scholarship goal to get engaged with this community. This will help to lead to new collaborations.

To help organize the conference, I will work closely with Jaron Hansen from the Chemistry and Biochemistry department, who was on the organizing committee last year. Together, we will arrange for a venue to have the conference on campus, take care of the logistics for the conference (e.g. lunches, food for breaks, AV equipment, poster stands), and set up a web page for conference registration and submitting presentation/poster abstracts. I will be part of the organizing committee that meets monthly leading up to the conference and weekly the month of the conference. Organizing this conference allows me to help grow a vibrant air quality research community in the state, contribute my time to an important cause, and develop new collaborations and get exposure for my research.