Student-Related Activities Statement

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1 Summary

My workload allocation for student-related activities at NAU is summarized in Table 1. In this statement, I focus on those activities since I joined NAU in 2018. I refer the reader to my CV in Appendix F for the full record of my teaching and student-related efforts.

Table 1: *Student-related activity workload allocation.*

Academic Year	Student-Related Allocation (%)
2017–2018 (half-year)	5 (half-year)
2018–2019	15
2019–2020	22.5
2020–2021	27
2021–2022	25
2022–2023	30

1.1 Expectations for Promotion

The School of Informatics, Computing, and Cyber Systems (SICCS) Conditions of Faculty Service (COFS) documentation, found in Appendix E, states that the following criteria are to be met for promotion to Associate Professor with Tenure in relation to student-related activities (labels and emphases added are my own to aid analysis).

> *"In student-related activities, faculty must demonstrate substantial and consistent evidence of effectiveness in (I) teaching, (II) student mentorship, (III) program assessment, and (IV) other student-related activities. Faculty are expected to have served or be serving as a research advisor for graduate students, as appropriate to their scholarly workload."*

Based on these criteria, in this statement, I discuss my accomplishments in teaching (Section 2), student mentorship (Section 3), program assessment (Section 4), and other student-related activities (Section 5).

1.2 Summary of Accomplishments

Table 2 maps evidence presented in this document to the criteria outlined in the SICCS COFS statement for promotion and tenure (as discussed in Section 1.1).

Table 2: *Summary of student-related activity accomplishments and supporting evidence mapped to the criteria in the SICCS COFS.*

Criterion	**Supporting Evidence**
(I) Teaching	I have substantially exceeded the COFS expectations to receive the highest rating of ***highly meritorious*** in student-related activities every year (see Table 3). I have taught 10 sections of regular courses and supervised 4 undergraduate students and 11 graduate students in individual study/research courses (see Table 4). I have developed or completely re-designed 4 courses (EE458 Automatic Controls, EE558 Advanced Automatic Controls, EE499 Introduction to Autonomous Driving, EE599/EE559 Modern Control Systems), each with significant hands-on and experiential learning components, such as hardware-based labs like a temperature control system, a self-balancing robot, and an autonomous race car (see Section 2.2, Figures 1 and 2). I have received excellent student feedback as evidenced by the high evaluation scores for my courses (3.50/4.00 average for co-convened EE458/EE558 and 3.75/4.00 average for EE599/EE559); see Appendix B and Section 2.3 for details. See Section 2 for more details.
(II) Student Mentorship	I have advised 12 graduate students, 10 undergraduate research students, and 10 Capstone project teams (34 students total). Four students graduated with their MS EE degrees. I am currently advising a PhD student and two Master's students. I have published 9 papers with my students: 8 with my graduate students (7 where students are the first author and 1 where students are co-authors, including 2 journal papers and 6 conference papers), and a conference paper with undergraduate students. The papers are published in well-regarded journals and conferences. My students won a best presentation award, the NAU Presidential Fellowship, and co-founded a robotics startup company in the US. My former MS/BS students have become PhD/MS students in prestigious graduate programs in the US. See Section 3 for more details.
(III) Program Assessment	I have worked on program assessment and report preparation for the ABET accreditation of our BS programs. I have worked on curriculum review and improvement of our BS EE and MS EE programs. I have co-developed proposals for enhancing our PhD Informatics & Computing program and for a new emphasis area in ECE in the PhD program. I have contributed to other efforts such as a new certificate program in semiconductors/microelectronics. See Section 4 for more details.
(IV) Other Activities	I co-organized the SICCS Graduate Recruitment Weekend in 2020, have performed various student-related and mentoring activities, and have participated in 5 MS/PhD exam committees for students advised by my colleagues. See Section 5 for more details.

1.3 Annual Evaluations

Table 3 summarizes my student-related activities ratings by the SICCS Annual Review Committee (ARC) and the SICCS Director's evaluation, where possible ratings are as follows: unsatisfactory, satisfactory (for meeting expectations), meritorious (for *exceeding expectations*), and highly meritorious (for *substantially exceeding expectation*). I have received the highest possible rating, *highly meritorious*, in the student-related activity category every year since I joined NAU, which clearly shows that I have substantially exceeded expectations in this activities category. A detailed summary of all the courses that I have taught at NAU can be found in Appendix B. The full annual reviews by the ARC and the SICCS director are included in Appendix A.

Table 3: *Annual evaluation ratings for my student-related activities.*

Academic Year	ARC Evaluation	Director's Evaluation
2017–2018 (half-year)	Highly Meritorious	Highly Meritorious
2018–2019	Highly Meritorious	Highly Meritorious
2019–2020	Highly Meritorious	Highly Meritorious
2020–2021	Highly Meritorious	Highly Meritorious
2021–2022	Highly Meritorious	Highly Meritorious
2022–2023	Highly Meritorious	Highly Meritorious
Average	Highly Meritorious	Highly Meritorious

2 Teaching

Teaching is an essential and enjoyable part of being a faculty member. In this section, I describe my teaching at NAU, starting with my teaching philosophy.

2.1 Teaching Philosophy

My teaching philosophy mirrors my interdisciplinary approach towards research. I aim to ensure that students cultivate a strong and broad background in electrical engineering (EE), a holistic view and hands-on skills of system design and development, and an appreciation of the broad application of EE in many technical and societal areas. I believe that, to prepare students for engineering careers, a successful engineering and applied science education must: (1) equip students with a solid foundation of the field; (2) provide students with hands-on experience and practical skills; (3) stimulate and encourage students to make an impact; and (4) move away from compartmentalization to appreciate diversity and interdisciplinary collaboration. I try to view myself primarily as a *facilitator of learning* rather than as an expert simply delivering information to students.

A solid foundation. Every engineer must possess a solid foundation of their field. An education program must equip its graduates with the fundamental knowledge and skills of the field. However, without proper motivations and guidance, they can be rather tedious and difficult to learn and comprehend for many students. My approach to motivating learning is to use concrete examples, especially every-day examples to which students can easily relate. I use plenty of examples in my teaching, including simulations and real experiments, to motivate and illustrate the basic concepts and make abstract theories more interesting and easier to understand. I have observed that interactive lectures and live demonstrations are powerful and intuitive tools to engage students and help them grasp theoretical concepts; for example, in my control theory courses, I use Matlab and Simulink simulations extensively to illustrate how theoretical concepts come from and are applied in practical problems. In my experience, by putting knowledge into context, I can enable students to experience its relevance and help them feel confident to learn by doing, thereby increasing their investment in the learning process. I have also found it important to guide student learning with a big picture or roadmap of the course or the field, to help students visualize the "pieces" and understand how they fit together. I motivate the materials using a top-down approach: show students where we aim to be at the end of the course and how we intend to get there. Additionally, since many EE concepts are repeated in several courses, I always try to show in my teaching the cohesive nature of these concepts between different courses and subfields of EE, so students can appreciate the unification of these concepts and focus their efforts on critical thinking and problem solving after they grasp the fundamentals.

Practical skills. An engineering student needs to have both a solid foundation and practical technical skills. The latter is complementary to the first in that it helps reinforce the foundational knowledge of a student. My teaching always emphasizes hands-on experience through lab experiments and projects. For example, my control courses at NAU include experiments with a temperature control system and a self-balancing robot; in my autonomous driving course at NAU, students built their own small-scale autonomous race cars and wrote code to drive the cars autonomously. Course projects are also excellent opportunities for students to learn and improve their critical thinking and engineering development skill, which I utilize frequently in my courses, especially at the senior and graduate levels. The practical skills learned from these exercises will motivate students and strengthen their fundamental knowledge. Another way to help students gain practical experience is to involve them in research and other real-world projects, for which I have actively encouraged and recruited undergraduate students to work in my lab. This emphasis on developing hands-on critical thinking skills forms the bedrock of my teaching approach.

Make an impact. I believe that a major goal of every engineer is to make societal and economic impacts. Our mission as educators is to stimulate students' development to their full potential and provide them with prospects to go beyond the regular curriculum. Students should be given opportunities to work on practical, real-world problems in research projects, which students and faculty can greatly benefit from. I have mentored students at different institutions in research projects, independent studies, and Capstone design projects. My students have won research awards, written research papers, and presented at conferences. In addition to making tangible results while having fun and enjoying the process, challenging students to make an impact by developing real solutions and building real systems has proved to be a great transition to graduate school or careers in industry.

Diversity. Modern engineering and applied science are no longer constrained to a single discipline or domain. Engineers and researchers nowadays often need to collaborate with people with different backgrounds and use tools and methods that require knowledge of other domains. For example, a smart building control engineer or researcher, besides training and skills in controls, must have knowledge of, use tools for, and collaborate with experts in building energy systems. My control courses often have students from diverse backgrounds in EE, Computer Science, Mechanical Engineering, and even Bioengineering, who contribute interesting and diverse perspectives to the courses. In my teaching, I strive to use examples from various fields, such as robotics, autonomous driving, and medical devices, to show the diverse nature of modern engineering. I believe that, to comply with educational needs for the next generation of workforce, we must move away from the standard compartmentalized educational approach and add diversity to the curriculum. Our curriculum should be able to accommodate students with different backgrounds and train them to appreciate diversity and be able to collaborate across disciplines.

2.2 Course Development

One of my overall teaching goals at NAU, as a faculty member in EE, is to strengthen the EE curriculum around control theory and engineering, autonomous systems, and cyber-physical systems at NAU, at both the undergraduate and graduate levels. Towards this goal, I have spent significant efforts in improving existing core control courses and developing new courses at NAU since I joined in 2018, which are summarized below. My focus has been on making the courses at NAU in these areas up-to-date and equipping students with practical knowledge and skills through experiential learning, aligned with my teaching philosophy as outlined in Section 2.1.

Re-designed EE458 Automatic Controls: When I joined NAU, I started to completely re-design the core control course EE458 at NAU as it had not been taught since 2016 and did not provide any practical hardware-based labs beyond software-based exercises with Matlab. I created a new syllabus with integrated hardware-based labs and experiential learning components. I created or updated all lectures and slides, and developed new assignments, exams, and a question bank. More importantly, to support training students of practical skills, I developed several series of simulation-based and hardware-based labs and projects. In addition to Matlab, the labs also utilize Simulink – a useful tool which is very popular in industry. The new hardware-based labs / projects include a temperature control system (TCLab developed by Prof. John Hedengren at BYU/APMonitor) and a self-balancing robot (developed by MinSeg), which are shown in Figure 1. The new software-based labs / projects include systems commonly used in teaching control theory and engineering[1]: a cruise control system, a motor position control system, a ball and beam system, and a car suspension system. The new developments took significant time and effort from me and several iterations to finalize, but they have been very well-received by the students taking the course in the years since. Samples of the new course materials developed by me can be found in Appendix C.

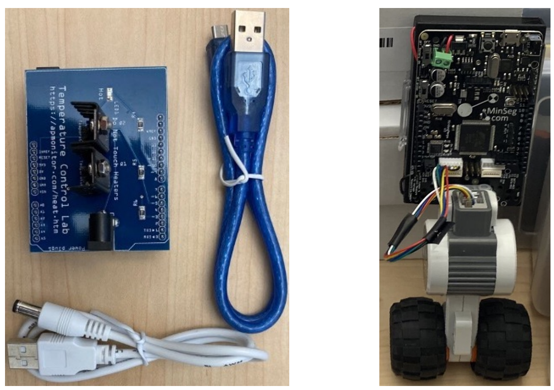

Figure 1: *The new hardware-based labs developed for EE458 Automatic Controls, EE558 Advanced Automatic Controls, and EE559/EE599 Modern Control Systems: a temperature control system TCLab (left) and a self-balancing robot (right).*

Developed co-convened EE558 Advanced Automatic Controls: When it became apparent that a portion of new EE graduate students at NAU lacked a background in control and dynamical systems, hampering their graduate studies, I developed a graduate-level basic control course, EE558 Advanced Automatic Controls, which is based on and co-convened with the undergraduate-level course EE458. It has some more advanced topics, assignments, and projects, compared with the undergraduate course, and aims to provide graduate students with basic knowledge and skills of feedback control theory for subsequent control courses. It has served not only EE graduate students but also graduate students in Mechanical Engineering and BioEngineering.

Developed EE499 Introduction to Autonomous Driving: In Spring 2020, supported by a grant from the Institute of Electrical and Electronics Engineers (IEEE), I developed a special topic course

[1]The Control Tutorials for Matlab and Simulink developed at the University of Michigan: `https://ctms.engin.umich.edu/CTMS/index.php?aux=Home`.

(EE499) for senior students and early graduate students at NAU on the fundamental technologies of autonomous driving, using the F1/10 autonomous race car platform[2]. The course is highly hands-on: students are divided into groups of 3-4, each group learn and build their own F1/10 race car following instructions, then they are taught and practice on their F1/10 race cars topics including robot operating system (ROS), fundamentals of vehicles, basic controls, sensors, mapping and localization, computer vision, and motion planning. To prepare for this course, in Fall 2019, my graduate students and I built a car prototype, and I developed the learning materials for the course, including lectures, code, and lab assignments.

Developed EE559 Modern Control Systems: As part of my effort to expand and improve the EE curriculum around control theory and engineering at NAU, starting in AY 2021–2022, I developed from scratch a new course Modern Control Systems (initially offered as EE599, to be assigned permanent number EE559). The course is focused on modern control systems and techniques and contains three main parts: (1) state-space control systems, (2) an introduction to optimal control, and (3) an introduction to optimization and model predictive control with practical applications. Similar to other control courses that I have developed and aligned with my teaching philosophy, this course is designed to be practical and hands-on, with hardware-based labs including a dual temperature control system and a self-balancing robot (see Figure 1).

2.3 Teaching Responsibilities

Since arriving at NAU, I have been mainly responsible for teaching the control courses at NAU, including the upper-division EE elective EE458, the co-convened graduate course EE558 (new development), and the graduate course EE599/EE559 (new development). In addition, I developed and taught an introductory course on autonomous driving (EE499), and was once assigned to teach EE222 Intermediate Programming, which covers C programming, due to a shortage of the school's teaching capacity. My course development efforts are elaborated in Section 2.2. Table 4 summarizes my teaching activities, where I have taught 10 sections of undergraduate and graduate students for various regular courses. Furthermore, I have supervised undergraduate research projects for 4 students and graduate research projects for 11 students (see research courses in Table 4).

2.3.1 EE458/EE599: Automatic Controls; EE558: Advanced Automatic Controls

This course was offered as EE599 in Fall 2018 due to a registrar issue. Furthermore, in Fall 2022, this course was taught to graduate students as the co-convened EE558, with additional expectations. For clarity, in what follows, I will discuss my experiences with both the undergraduate and graduate level classes, but I will not make a distinction between them or between the course offering in Fall 2018 as EE599. The course syllabus and some course samples can be found in Appendix C.

Summary: This course develops an understanding of the theory of automatic control and its applications. The focus is on modeling, analysis, design, and simulation of linear feedback control systems in the frequency domain. The course is designed with two sections: a lecture section and a 2.5-hours-per-week lab section where labs and design projects are conducted. **Learning outcomes (LOs)**: Upon completion of this course, students will (LO1) understand the principles, advantages and limitations of feedback control; (LO2) be familiar with the widespread application areas of automatic control, especially in electrical and mechanical systems; (LO3) understand and have practiced developing linear models of physical systems, linearization, Laplace transforms, transfer functions, and manipulating block diagrams; (LO4) understand the concept of and learn methods for stability and

[2]Website: `https://f1tenth.org/`.

Table 4: *Number of sections taught for each course. For all research courses, the number of sections is an administrative detail; sometimes a single section is open for one student, or multiple students are in the same section. See Appendix B for additional information, including enrollment in each course.*
$^{\perp}$ *In Fall 2018, EE458 was taught as EE599 due to a registrar issue.*

Course	18–19	19–20	20–21	21–22	22–23	Total
Lecture/Standard Courses						
EE458 - Automatic Controls	$1^{\perp}$	1	1	1	1	5
EE558 - Advanced Automatic Controls					1	1
EE599/559 - Modern Control Systems				1	1	2
EE499 - Introduction to Autonomous Driving		1				1
EE222 - Intermediate Programming			1			1
Research Courses						
EE485 - Undergraduate Research		1		1		2
CS485 - Undergraduate Research	1				1	2
EE685 - Graduate Research				1	2	3
CS685 - Graduate Research				1		1
INF685 - Graduate Research			4		1	5
INF697 - Independent Study			1		1	2

performance analysis of feedback control systems, steady-state error analysis, Routh-Hurwitz stability analysis; (LO5) learn and practice the root locus method for analyzing and designing feedback control systems, PID controller and PID tuning, and lead-lag compensators; (LO6) learn and practice frequency response method for analyzing and designing feedback control systems, Bode plots, and the Nyquist criterion; and (LO7) learn to use Matlab, Simulink, and the Matlab's Control System Toolbox for modeling, analysis, and design of feedback control systems. In addition, students will (LO8) apply the learned knowledge and develop practical skills in modeling, analyzing, and designing automatic control systems through several labs and design projects. Note that (LO8) supports my teaching philosophy (Section 2.1), which ***emphasizes experiential learning and training students' practical skills*** through hands-on experience with lab experiments and projects.

In what follows, I outline the graded components of the course, which are designed to evaluate a student's mastery of the materials in this course for the learning outcomes (LO1)–(LO8).

Quizzes (LO1, LO2, LO3, LO4, LO5, LO6): There is a short low-stakes (online) quiz after each week's lectures to assess students' understanding of the topics discussed in the lectures. Quiz questions are usually at the low and medium levels of difficulty. This aims to encourage students to study to acquire fundamental knowledge of the subject.

Homework assignments (LO3, LO4, LO5, LO6): There are 6 homework assignments assigned on a regular basis throughout the semester. Some assignments involve working in Matlab and reporting code, computation results, and plots. Questions in homework assignments are usually at the medium to high levels of difficulty, to prepare students for exams. A sample of a homework assignment from the latest course offering can be found in Appendix C. This offering was for co-convened EE458 and EE558 courses for both undergraduate and graduate students. Some questions in this assignment are marked specifically for either undergraduate or graduate students.

Exams (LO1, LO2, LO3, LO4, LO5, LO6): There are two midterm exams and a final exam, equally spaced throughout the semester. The final exam is comprehensive and tests students on all topic covered in the course. Each exam has basic multiple-choice questions, short-answer questions, and long-answer questions. There are a variety of questions, from basic to advanced and from theoretical to applied. Each exam is randomly and individually generated for each student. A sample of a midterm exam from the latest course offering can be found in Appendix C.

Labs: (LO3, LO4, LO5, LO6, LO7, LO8): There are 5 computer-based and hardware-based lab assignments. The computer-based labs include exercises using Matlab and Simulink for system modeling, simulation, analysis, and control design, for systems commonly used in teaching control theory and engineering[3], such as a cruise control system, a motor position control system, a ball and beam system, and a car suspension system. These labs teach very valuable skills for students as these software packages are widely used in industry and often required for many jobs. The hardware-based labs, which I developed as described in Section 2.2, include a temperature control system (TCLab developed by Prof. John Hedengren at BYU/APMonitor) and, optional for graduate students, a self-balancing robot (developed by MinSeg). The lab hardware is shown in Figure 1 on page 5. For each lab assignment, each student must submit Matlab code / Simulink model and a lab report. Appendix C contains samples of a computer-based lab and a hardware-based lab.

Student Feedback: Table 5 breaks down the mean scores for each of the seven Likert-scale questions on the course evaluations for EE458 Automatic Controls and its variants. The score range is 1-4, with 3 and above typically being considered good. Note that only the scores for the main lecture section (section 001) are reported and discussed as many students only evaluated this section but not the lab section (section A). The detailed course evaluations can be found in Appendix D.

Table 5: *Course evaluation scores broken down by question for EE458 Automatic Controls and its variants over the years ("g" denotes a graduate section). The score range is 1-4, with 3 and above typically being considered good. The scores for the main lecture section (section 001) are reported as many students only evaluated this section but not the lab section (section A).*

Question	F18 EE599	F19 EE458	F20 EE458	F21 EE458	F22 EE458	F22g EE558	Mean
Q1: Course requirements are stated clearly in the syllabus.	3.4	3.4	3.8	3.8	3.6	3.7	3.61
Q2: The course is organized in a way that helps me learn.	3.3	3.1	3.7	3.6	3.4	3.4	3.41
Q3: The grading criteria for each assignment are clear.	3.4	3.4	4.0	3.6	3.5	3.4	3.54
Q4: The assignments help me understand the subject more clearly.	3.2	3.3	3.8	3.5	3.3	3.1	3.36
Q5: The instructor answers questions and concerns in a timely manner.	3.6	3.4	3.8	3.7	3.5	3.4	3.56
Q6: The instructor provides constructive feedback on assignments.	3.4	3.3	3.8	3.5	3.3	3.3	3.43
Q7: The instructor shows respect for students.	3.6	3.4	3.8	3.8	3.7	3.4	3.61
						Mean:	3.50

Overall, I have received high course evaluation scores for my Automatic Controls class, for both the undergraduate and the graduate sections. My average student evaluation rating for the last five years across all sections and all questions was 3.5. My teaching of these classes has also improved over the years, with the scores for the recent offerings (Fall 2021 and Fall 2022) being consistently higher than those for the early offerings (Fall 2018 and Fall 2019). This trend reflects the significant effort I

[3] The Control Tutorials for Matlab and Simulink developed at the University of Michigan: `https://ctms.engin.umich.edu/CTMS/index.php?aux=Home`.

have been spending on improving the courses in all aspects. I seek and value student comments each semester to continue improving my course content and delivery. The student comments (found in Appendix D) were generally positive. Below, I quote some student comments that I have received in the course evaluations for these classes over the years as grouped into different themes.

Course materials, including hands-on exercises / labs / projects:

- "The lectures were very organized and the assignments had the same material as the lectures."
- "I think working on the project has contributed the most to my understanding of control systems. I liked having to work on the project throughout the semester."
- "I found the project we completed to be extremely interesting and very applicable to what we were learning in class."
- "I liked the projects because they contributed the most to my learning. I liked how the comments were added to show us the process and what we need to work on. They were challenging because I did not know if my outputs were correct, but it was fun to work on."
- "I like how each topic built onto one other. The harder topics can be derived logically with the basic understanding of system engineering."
- "I enjoyed the challenge that the course provides as well as the pace of the class."
- "I think each kind of assignment played its own unique role in teaching. The quizzes required immediate surface level comprehension, homework asked for more in depth and longer answers, and the labs put that understanding to the test in application."
- "The material covered is extremely interesting and useful."

Instructor quality, respect for students and student interaction: Emphases are my own.

- "To be honest, this was probably the hardest course that I have taken. However despite the course being hard, I enjoyed the care that my professor offered. You can tell that he truly cares about his students."
- "Dr. Nghiem is an excellent instructor. His lectures are easy to understand, and he is a personable, compassionate teacher."
- "The professor is always available for assistance and to help us better understand the applications of the topics"
- "Interesting and helpful content, and Dr. Nghiem is an excellent instructor."
- "How engaging the professor is"
- "The manner in which the professor taught was very engaging and how open he was to questions was very helpful."
- "I think my favorite thing about the class was the professor. I struggle with signals and systems and control systems was too similar to signals and systems. I would have liked having this professor for a non signal based class."
- "I liked how the professor was very concerned for our success and adjusted the class pace to match our performance. Dr. Nghiem teaches a very difficult course and he does a very great job at lecturing and explaining the content."
- "That Dr. Nghiem was concerned with the opinions of his students and at times made changes to the curriculum to better fit with what they thought was best."

Reflections on Teaching Automatic Controls: In what follows, I reflect on teaching the subject of automatic controls to students in our programs, especially undergraduate students, and changes that I made to my courses over the years based on student feedback.

- Being particularly math-heavy topics, which require strong backgrounds in both mathematics and engineering, automatic control courses are among the most challenging courses in our EE curriculum. I have put in substantial effort to make my courses more accessible and more practical without sacrificing the quality, to help students learn better and succeed in these difficult courses. I also implemented an Assessment Test that all students take in their first week (but that is not included in their course grades), which was designed to give them an honest assessment of their mathematical skills that are required for the course. If a student performs poorly in the test, I give them a list of resources for reviewing the required mathematical knowledge and skills, which I encourage them to self-study as soon as they can. Thanks to my approach, in recent offerings, fewer students struggled with mathematics in this course compared to earlier offerings. I went out of my way during and outside of my office hours to help students who had difficulties, including personally contacting them to offer my help.

- Near the middle of the semester, after the first mid-term exam, I usually obtained mid-term feedback on the course and my teaching from students using an anonymous form, from which I often received helpful and constructive comments. These comments have allowed me to adapt my teaching and make appropriate changes in the course to address issues and suggestions raised by students. This approach has helped me improve my teaching and my classes substantially and has earned me praises by students, as quoted above.
- One of the successes of this course, and also a contributing factor to effective student learning, has been the hands-on labs and projects, both computer-based and hardware-based, that I developed. The experiential learning component of my classes has helped students learn, understand, and practice better the concepts and methods taught. It has also helped students develop their practical skills and prepare for their jobs. This is clearly reflected in the student feedback on the course, as quoted above. I have been continuously enhancing the hands-on and experiential learning component of my courses by not only improving the existing labs and projects but also developing new labs and projects; for example, with support from the EE program and generous donors, I recently purchased and will incorporate new labs into my courses, including a double inverted pendulum.
- During the COVID-19 pandemic in AY2020–2021 (and to some extent, AY2021–2022), when my classes were offered in a hybrid mode combining in-person and remote learning, I quickly and successfully adapted all in-person labs to computer-based projects and at-home hardware-based labs where students could bring home low-cost TCLab hardware kits for doing experimental labs.
- Since the COVID-19 pandemic and even after we returned to in-person classes, I have continued using some online teaching technologies that I found beneficial for my teaching and student learning, such as online quizzes, interactive simulations, and video recorded lectures and tutorials of software and labs. Also, while teaching online, I gained an appreciation for virtual office hours via Zoom. Since then, for all my classes, I have always offered either virtual-only office hours or a hybrid option (both in-person and virtual office hours per week), so that office hours are more accessible/convenient and less stressful for students.

2.3.2 EE599/EE559: Modern Control Systems

This course has been designed to be a follow-on of the basic classical control course EE458 and its co-convened course EE558 (which I discussed in Section 2.3.1). It aims to provide graduate students and advanced senior students with knowledge and skills in modeling, analysis, design, simulation, and implementation of control systems using modern techniques, with broad application in industry, to prepare them for future careers and research in the field. More details are discussed below. NAU had never had such a course before I developed it from scratch in AY2021–2022. With EE458/EE558 and future control courses to be developed, this course will constitute a modern curriculum in control and autonomous systems at NAU. The syllabus and some sample materials for this course can be found in Appendix C.

Summary: This course develops an understanding of the theory and applications of modern control systems. Together with EE458/EE558, which focuses on classical control theory, this course will provide students with the advanced knowledge and skills expected in careers in robotics, industry automation, autonomous systems, and other complex systems. The topics include modeling, analysis, design, simulation, and implementation of modern control systems in state space, in both continuous time and discrete time; optimal control design with linear quadratic regulator (LQR) and linear quadratic Gaussian (LQG) control methods; and an introduction to model predictive control (MPC) and its applications. **Learning outcomes (LOs)**: Upon completion of this course, students will (LO1) be able to recognize and describe the widespread application of modern control, especially in electrical and mechanical systems; (LO2) understand, choose, practice, and demonstrate methods for developing models of physical systems in state space, linearization, conversion between transfer functions and state-space models, and solutions of state-space models; (LO3) understand the concepts of, apply methods for, analyze, and evaluate the performance and design of feedback control systems in state space, including: stability, controllability, observability, full-state feedback, output feedback, observer design, LQR; (LO4) understand the basic concepts of, formulate problems for, and implement standard algorithms for continuous mathematical optimization and model predictive control (MPC); (LO5) use Matlab, Simulink, Matlab's Control System Toolbox, Matlab's Optimization toolbox, Matlab's Model Predictive Control toolbox, and other relevant software tools for modeling, simulation, analysis, and design of state space control systems, optimal control systems, and MPC.

I wrote all the lecture slides and notes, which are shared with students so that no textbook is required for this course. In what follows, I outline the graded components of the course, which are designed to evaluate a student's mastery of the materials in this course for the learning outcomes (LO1)–(LO5).

Quizzes (LO1, LO2, LO3, LO4): There is a short low-stakes (online) quiz after each week's lectures to assess students' basic understanding of the topics discussed in the lectures. Quiz questions are usually at the low and medium levels of difficulty. This aims to encourage students to study to acquire fundamental knowledge of the subject.

Homework assignments (LO1, LO2, LO3, LO4, LO5): There are 5 homework assignments assigned on a regular basis throughout the semester. Some assignments involve programming in Matlab or an alternative language such as Python or Julia, and reporting code, computation results, and plots. Questions in homework assignments are usually at the medium to high levels of difficulty, to prepare students for exams. A sample of a homework assignment from the latest course offering can be found in Appendix C.

Midterm exam (LO2, LO3): There is a midterm exam on all topics covered in class before the exam. The exam has basic multiple-choice questions, short-answer questions, and long-answer questions, which are randomly and individually generated for each student.

Final exam (LO1, LO2, LO3, LO4) or course project (LO2, LO3, LO4, LO5): There is a comprehensive final exam on all topics covered in the course, which has basic multiple-choice questions, short-answer questions, and long-answer questions, from basic to advanced and from theoretical to applied. The final exam is randomly and individually generated for each student. Alternatively, a student may opt to do a semester-long course project, a project presentation, and a project report to replace the final exam. A student may also do a course project and take the final exam, and will receive the higher score of the two for the final. Potential projects include state-space modeling, analysis, control design (state feedback, LQR, MPC), and control implementation of the temperature control system lab (TCLab)[4], the self-balancing robot MinSeg (see Figure 1), a simulated quadcopter, and other complex systems.

Student Feedback: Table 6 breaks down the mean scores for each of the seven Likert-scale questions on the course evaluations for EE599/559 Modern Control Systems. The course has been offered twice, in Spring 2022 and Spring 2023. The detailed course evaluations can be found in Appendix D.

Table 6: *Course evaluation scores broken down by question for EE599/559 Modern Control Systems over the years.*

Question	S22	S23	Mean
Q1: Course requirements are stated clearly in the syllabus.	3.7	4	3.85
Q2: The course is organized in a way that helps me learn.	3.5	4	3.74
Q3: The grading criteria for each assignment are clear.	3.4	4	3.69
Q4: The assignments help me understand the subject more clearly.	3.5	4	3.74
Q5: The instructor answers questions and concerns in a timely manner.	3.6	4	3.79
Q6: The instructor provides constructive feedback on assignments.	3.3	4	3.63
Q7: The instructor shows respect for students.	3.6	4	3.79
		Mean:	3.75

I have received high evaluation scores for both offerings of the course, with an overall average of 3.75 (in a 1-4 range). The student comments (found in Appendix D) were generally positive, especially for a new course that was developed and taught for the first time. Below, I quote some student comments that I have received in the course evaluations, where emphases are my own.

- "The material seemed very helpful for future jobs, both controls and optimization."
- "Very interesting content."
- "The lecture slides were well structured, did not need a book at all."
- "I think the course was extremely well laid out and it was clear how much effort our instructor put into it and I am really thankful for that."
- "I love modern control. And I am glad that we have a responsible professor. He's very nice."
- "I like the professor's lecture best."
- "I found this course well-designed and helpful in terms of structure and content."
- "The introduction to a wide variety of topics in modern control theory was very interesting. It provided enough detail on many topics to understand some of the basic theory, but didn't dive too deep into the math."
- "Firstly, the instructor's knowledge and expertise in the subject matter were evident throughout the course. His ability to explain complex concepts in a clear and concise manner made learning accessible. Secondly, we worked on projects related to our research during the course, which was valuable. In addition, each student was assigned a paper related to their project to read and present. I found that reading and understanding the paper added to my knowledge. This course has been a very rewarding experience for me overall. It has provided me with knowledge and skills to apply to my research."

Reflections on Teaching Modern Control Systems: Many of my reflections on teaching automatic controls are applicable to this course, so I will only reflect on those that are unique to this course.

[4] TCLab, shown in Figure 1, was developed by Prof. John Hedengren at BYU/APMonitor.

- Although this course uses the state-space approach, it turns out that it does require students to have good knowledge of basic feedback control concepts and of classical control theory (taught in EE458 / EE558), in addition to a good background in linear algebra. When the course was first offered in Spring 2022, I spent two weeks reviewing these topics; however, students who lacked these backgrounds struggled in the class. I changed the prerequisites of the course to require them, as shown in the latest course syllabus in Appendix C, and added a short ungraded self-assessment test. These changes have improved the class quality substantially, as reflected in the top course evaluation scores for the second offering in Spring 2023.
- Many students enjoyed practical course projects, especially on real hardware such as the temperature control system lab (TCLab) or the self-balancing robot, or projects that are related to their own research; see student comments in Appendix C. As with EE458 / EE558, I believe that hands-on experiential learning can greatly engage students and enhance their learning and experience in the class. In future offerings, I will continue this practice and plan to add more practical project choices.

2.3.3 EE499: Introduction to Autonomous Driving

In Spring 2020, with funding support from the Institute of Electrical and Electronics Engineers (IEEE), I developed and taught a special topic course (EE499) for senior and graduate students in EE, Computer Science (CS), and Mechanical Engineering (ME) at NAU on the fundamental technologies of autonomous driving, using the F1/10 autonomous race car platform[5]. I designed the course to have a strong focus on developing hands-on skill and practical knowledge. The students were divided into groups of 3-4 students of both Engineering and CS. Each group together built their own F1/10 race car, then learned and practiced on their cars topics including robot operating system (ROS), fundamentals of vehicles, basic controls, sensors, mapping and localization, computer vision, and motion planning. I used the flipped classroom model, where students learned the materials in their own time by watching lecture videos and reading materials, and the class time was dedicated to practicing on the real cars. I was selective in allowing students to enroll in this class since it required skills and knowledge in electronics, embedded system programming, computer programming, robotics, as well as high self-motivation. I personally interviewed each student who wanted to enroll in the course and, in the end, only 10 students were accepted.

The class was disrupted by the COVID-19 pandemic and the closure of in-person classes at NAU in the middle of the semester. Since the class had to move completely online in just two weeks, I quickly developed a computer simulator of the car and converted all the learning and labs to online format. While it was disappointing that we had to move the class online, the students were able to complete all the planned learning topics and labs using the simulator. Most students had a good learning experience and enjoyed the class, though impacted by the pandemic, as reflected in the course evaluation comments and scores (in Appendix D), with an average score of 3.5 (in a 1–4 range). The course has not been offered again since then due to our school's reduced teaching capacity, as a result of the pandemic. However, I plan to update the course and resume it in a near future.

The syllabus and a sample lab of the class in Spring 2020 are included in Appendix C. Figure 2 shows a photo of a car built by the students on the left. A video demonstrating a real autonomous driving experiment of a car, implemented by students, can be found on YouTube at `https://youtube.com/shorts/hO1q4MLmvuA`; a screenshot of it is shown on the right of Figure 2.

[5] F1/10 Autonomous Racing: `https://f1tenth.org/`.

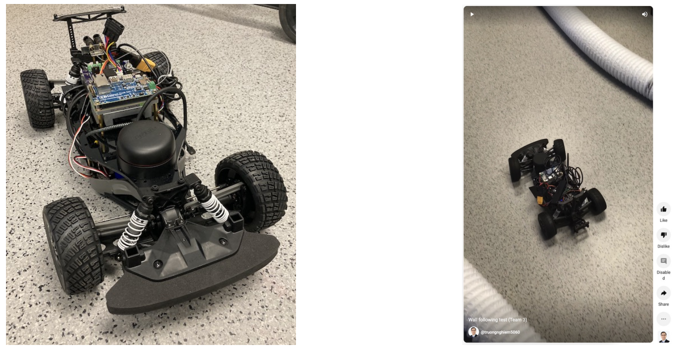

Figure 2: *Left: photo of an autonomous race car built by the students of EE499 in Spring 2020. Right: screenshot of a video demonstrating a real autonomous driving experiment, implemented by the students of the same class; video can be found at* `https://youtube.com/shorts/hO1q4MLmvuA`*.*

2.3.4 EE222: Intermediate Programming

Due to the school's teaching needs in AY2020–2021 (because of the COVID-19 pandemic), I was assigned to teach EE222 Intermediate Programming in Spring 2021. This course, which teaches students computer programming in the C language, is not in my main area of expertise nor my primary teaching responsibility. I taught this course only once, therefore, I briefly summarize my teaching of this course without going into details in this section. The course syllabus can be found in Appendix C.

Since few teaching materials from the previous offerings of the course were shared with me, I had to (re-)develop this course almost from scratch. I employed an interactive C programming textbook offered by zyBooks[6] and supplemented it with my own lectures, exercises, coding assignments, and an engineering-related programming project. The online book and my approach are fully interactive with animations, and coding examples and exercises which students can modify and see the results and feedback immediately. All coding assignments are also online, where students would write and submit their code online, which is compiled, executed, and graded automatically and immediately, then receive instant feedback. Each assignment allows many or unlimited attempts, to encourage students to improve their code to achieve the full grade. In class, I supplemented the textbook with my own lectures on the same topics or additional topics, focusing on worked examples and coding problems, answered questions from students, and explained and gave feedback on their submitted assignments. All my lectures were interactive and dynamic, where embedded code examples could be modified and executed directly inside slides.

In what follows, I outline the graded components of the course, which are designed to evaluate a student's mastery of the materials in this course.

- **Textbook Participation Activities:** These are basic learning activities in the interactive textbook, which students must complete while reading.
- **Textbook Challenge Activities:** These are activities / problems for reinforcing knowledge and skills in the interactive textbook, which students must complete while or after reading.
- **Textbook Labs:** These are longer and more difficult problems to test skills, which students must complete by assigned deadlines.
- **Project:** Each student must complete a programming project during the semester, which is due near the end of the semester.
- **Final Exam:** There is a comprehensive final exam on all topics covered in the semester.

[6] Programming in C: `https://www.zybooks.com/catalog/programming-in-c/`.

I taught this course in Spring 2021 to 38 students without any grader/TA support. The detailed course evaluation of this one-time offering can be found in Appendix D. Most students had a good learning experience and enjoyed the class, as reflected in the course evaluation comments and scores, with an average score of 3.26 (in a range from 1 to 4). After Spring 2021, I passed on all my teaching materials and my experience to the next instructor of this course.

3 Student Mentorship

A large portion of my overall workload is allocated towards student mentorship at both the undergraduate and graduate levels. At NAU, I have mentored or co-mentored 12 graduate students, 10 undergraduate research students, and 10 senior design (or Capstone) project teams (34 students total) in both electrical engineering and computer science. I am currently advising a PhD student and two Masters's students. Table 7 summarizes my student mentorship.

Table 7: *Summary of students mentored at the undergraduate and graduate levels based on current status.*

Category	Graduated	Exited	In Progress	Total
Senior design (Capstone)	34 (10 teams)	0	0	34
Undergraduate research	10	0	0	10
MS (as primary advisor)	4	0	2	6
MS (others)	3	0	0	3
PhD	0	2	1	3
Total (excluding Capstone)	17	2	3	22

3.1 Mentoring Philosophy

My mentoring philosophy largely follows that of my former PhD advisor/mentor, Prof. George Pappas of the University of Pennsylvania, which is articulated in an article[7] titled "Mentor the Researcher, Not the Research: An Essay on PhD Mentoring." There are three fundamental aspects of the philosophy, which are summarized below.

Student-Centric Mentoring: Two primary models of graduate student mentoring exist: *project-centric mentoring*, where graduate students are recruited specifically for a sponsored research project, and *student-centric mentoring*, where the primary mentoring emphasis moves from the research project to the student and the focus is on reaching the maximum potential of every individual student. The student-centric mentoring philosophy may be adopted for two reasons. First, every student is different, so getting the most out of a student requires finding the right project for the student, not the right student for the project. Second, student-based mentoring focuses on educating great researchers to ensure that the student will produce great research during and after their study. It is therefore the **ideal integration of education and research**. This model works well for research groups that are well-funded, as students choose research projects suitable for them rather than suitable students are chosen for specific projects. I have used a **hybrid model**, described below.

- For undergraduate and MS students, I usually use a project-centric mentoring approach, by

[7]Article can be found at `https://almanac.upenn.edu/articles/mentor-the-researcher-not-the-research-an-essay-on-phd-mentoring` or `https://medium.com/penn-engineering/mentor-the-researcher-not-the-research-b6c714e96cd`.

finding and training suitable students to performs research toward realizing the goals of well-defined projects with clear objectives and deliverables.

- For a PhD student, I often start with the project-centric approach then *gradually transition* to the student-centric approach, as I know more about the student's technical strengths and intellectual interests. How fast the transition process is depends on the student's progress and capabilities.

I believe that my hybrid approach strikes a good balance between the two models and combines their advantages for both the mentees and mentor.

Promote Research Independence: An important goal of the student-centric mentoring model is to promote research independence for PhD students. It is a crucial aspect of mentoring PhD students as it prepares them to think like independent academics / researchers after they graduate, who can define their own research problems and chart their own research agenda. Formulating novel, relevant, and important research problems is a difficult skill but arguably the most critical skill a PhD researcher must learn. With my hybrid mentoring approach, which is described above, I have strived to maintain a balance between *mentoring the research* (i.e., completing a well-defined project with clear formulations, objectives, and deliverables) and *mentoring the researcher* (i.e., giving a PhD student the time and space they need to learn the skill and develop their own research).

Create an Intellectual Environment: Research students learn a lot from not only their advisors but also from other colleagues, such as other students, postdocs, collaborators, and visitors. Therefore, good mentoring also happens when the advisor creates a vibrant intellectual environment, where research peers have ample opportunities for research exchange and collaboration. This includes but is not limited to frequent group meetings, group seminars, social gatherings, conferences, and collaborations with other faculty and students. Since I joined NAU, I have been creating such an intellectual environment to various levels of success, for example a school-wide graduate seminar series did not pan out while my group meetings and external collaborations have been rather successful.

I have been developing and will continue to refine my mentoring approach to the unique nature of my research agenda, my research group, my school SICCS, and my university NAU.

3.2 Student Achievements

In what follows, I highlight some main achievements by my student advisees. As noted at the beginning of Section 3, the PhD in Informatics and Computing (PhD INF) program is the only PhD program of my school (SICCS), which encompasses several emphasis areas that are commensurate with the diverse research interests of the faculty of SICCS. However, and notably, it has no emphasis area in electrical engineering, which has made it **challenging for me (and other electrical engineering faculty) to recruit, train, and retain PhD students interested in electrical engineering**. This also means that my electrical engineering student advisees are required to enroll in courses that they normally would not take in a traditional electrical engineering program. Furthermore, most of my student advisees joined the program directly after their undergraduate studies (often from abroad), and thus did not transfer any graduate credits into the program. For these reasons, my graduate students were busy with coursework during their first two years, and some switched from the PhD program (without emphasis in electrical engineering) to the Master of Science in Electrical Engineering program. Consequently, except for one outstanding student, they have been typically less productive in research during their first two years.

Papers published by and other achievements of my undergraduate and graduate students are summarized in Table 8. I have published 7 papers with my graduate students where they are the first author, another paper where they are co-authors, and one paper with undergraduate students. Of these, two are journal papers and seven are conference papers.

Table 8: *Papers published and other achievements of my students. First author papers refer to those where the student led the work and was first author, whereas co-authored papers refer to papers where students contributed to the work, but did not lead the work.*

Student	Semester Begin	Semester End	First Author Papers	Co-authored Papers	Note
Graduate Students					
Viet-Anh Le	F19	S21	6	1	Now: PhD student UDel.
Trong-Doan Nguyen	F19	S21	1	1	Best presentation award; Now: co-founder Beagle Tech. Inc.
Liming Zheng	F21	S22	0	0	
Alyssa Stenberg	F21	S22	0	0	Now: Software eng. J.B. Hunt.
Yiwei Zhang	F21	S22	0	0	
Tung Nguyen	F22	S23	0	0	
Yujian Huang	F22	S23	0	0	Now: PhD student ASU.
Yifei Zhang	S23	F23	0	0	
Tran-Nam Nguyen	S24		0	0	Current student.
Cody Beck	S24		0	0	Current student.
Juan Rangel	S24		0	0	Current student.
Undergraduate Students					
Falon Ortega	S18	F18	0	0	Hooper Under. Res. Award; Now: Engineer at Gore.
Jack Garrard	S18	F18	0	0	Now: PhD student NAU.
Ryan Hitt	S18	F18	0	0	
Zhaolu Yang	F18	S19	0	1	Best presentation award; Now: graduate student at Columbia University
Daniel DiCarlo	F19	S20	0	0	I2S intern.
Rogelio Murguia	F21	F21	0	0	Mexican exchange student.
Jiaxin Liu	S22	S22	0	0	Now: MS student UC Boulder.
Cole Catron	F22	F22	0	0	LSAMP intern.
Isaiah Shipley	F22	S23	0	0	Co-advised with Dr. Shenkin.
Cody Beck	S22	F23	0	0	Became MS CS student.

I highlight **several outstanding students** whom I have advised:

- Viet-Anh Le was a PhD INF student who switched to MS EE, graduated, and became a PhD student in engineering at the University of Delaware. During his two years under my supervision and shortly after his graduation, he excelled in research and published 6 first-author papers (including 2 journal papers) and 1 co-authored paper with me. He was also awarded the prestigious NAU Presidential Fellowship.
- Trong-Doan Nguyen was a PhD INF student who switched to MS EE, graduated, then co-founded a robotics startup company (Beagle Technology Inc.). He published 1 first-author paper and 1 co-authored paper with me, and won a best presentation award for his conference paper.
- Zhaolu Yang was a BS in Computer Science student, who worked with me on machine learning for energy systems and later became a graduate student at Columbia University. Under my

supervision, he published a co-authored paper, which won a best presentation award.

My other MS students who did not (intend to) continue to PhD studies did not publish papers. The graduate students who have recently joined my lab have not yet published any papers.

Several of the venues that my student advisees have published in are well regarded, and I will elaborate on the quality of my publications in my *Scholarly Activities Statement.* Examples include the IEEE Sensors Journal, IEEE Access journal, IEEE Conference on Decision and Control (CDC) – the top conference in my field, American Control Conference (ACC) – the second top conference in my field, and IEEE Conference on Control Technology and Applications (CCTA) – a premier conference in my field.

4 Program Assessment

In addition to teaching and mentoring, I have been involved in assessing and reshaping some of our academic programs. Examples are as follows:

- In AY2018–2019, I participated in ABET meetings and the preparation for the ABET review of the Electrical and Computer Engineering programs, and co-authored an ABET assessment report on one outcome.
- In AY2019–2020 and AY2020–2021, I worked on the Electrical Engineering (EE) Curriculum Committee to review, discuss, and request changes to the EE curriculum, and also perform ABET-related tasks.
- In AY2021–2022, I co-chaired the Electrical Engineering (EE) Curriculum Committee to review the EE undergraduate and graduate curricula and develop the strategic areas for EE.
- In AY2022–2023, I chaired the Electrical and Computer Engineering (ECE) Curriculum Committee to discuss and make decisions on various matters related to all ECE undergraduate and graduate programs, including developing and updating undergraduate and graduate courses.
- In AY2022–2023, as the Assistant Chair of ECE, I co-developed with Kiona Ogle (Assistant Chair of Informatics) and Michael Gowanlock (Assistant Chair of Computer Science) a proposal for enhancing our PhD Informatics and Computing (PhD INF) program, and also developed a new emphasis area for ECE in the PhD INF program. I also assisted the school and college in developing new initiatives and a certificate program in semiconductors.

5 Other Activities

Other student-related and mentoring activities are as follows:

- In AY2019–2020, I co-organized the SICCS Graduate Recruitment Weekend in February 2020, which was a significant event aiming to recruit graduate students in different disciplines for SICCS. I was in charge of the EE discipline and reserving the venue for the event.
- I gave EE students feedback on their senior design (Capstone) project review presentations.
- With some of my colleagues, we started a graduate student research seminar that is now defunct.
- I participated in daily campus visits of prospective undergraduate students to the college who were interested in Electrical and Computer Engineering.
- I served as a referee for the NAU Undergraduate Research and Design Symposium (UGRADS).

I have been on 5 committees for students who are not my advisees, including MS thesis committees, and PhD comprehensive and candidacy exams committees. These committees are summarized below.

- **MS thesis committee.** Rajendra Shrestha, MS in Mechanical Engineering. Graduated in 2019. Advisor: Dr. Thomas Acker.
- **MS thesis committee.** Kristiyan Milev, MS in Electrical Engineering. Graduated in 2020. Advisor: Dr. Venkata Yaramasu.
- **PhD comprehensive exam committee.** Ai Zhang, PhD in Informatics and Computing. Advisor: Dr. Venkata Yaramasu.
- **PhD comprehensive exam committee** and **PhD candidacy exam.** Alexander Dahlmann, PhD in Informatics and Computing. Advisor: Dr. Venkata Yaramasu.
- **PhD comprehensive exam committee.** Manuel Aguilar Rios, PhD in Informatics and Computing. Advisor: Dr. Bertrand Cambou.

6 Conclusion

In summary, I have substantially exceeded the COFS expectations, as evidenced by the **highest ratings of *highly meritorious*** I received during my annual evaluations from both the Annual Review Committee and the school's Director each year (Table 3). In recent years, my student-related workload allocation has been between 25%-30% each year (see Table 1). My lecture courses are allocated between 20%-22.5% of my annual workload and, with my active student advising, I have far exceeded my workload allocation. A detailed summary of all the courses that I have taught at NAU, including lecture courses and research courses, can be found in Appendix B. I have received excellent student feedback as evidenced by the high evaluation scores for my courses, even for newly developed courses, courses that I taught for the first time, and courses that are considered very challenging for students in the EE curriculum; see Appendix B and Section 2.3 for details. In addition, I have been particularly active and dedicated in course development (see Section 2.2). I have developed or completely re-designed 4 courses, each of which includes significant hands-on and experiential learning components such as hardware-based labs like a temperature control system and a self-balancing robot (Figure 1), and an autonomous race car (Figure 2). My effort has substantially contributed to the improvement of our EE curriculum in recent years.

Regarding mentoring activities, I have advised 10 undergraduate research students, 12 graduate students, and 10 Capstone project teams (34 students total). I am currently advising a PhD student and two Master's students. I have published 9 papers with my students: 8 with my graduate students (7 where students are the first author and 1 where students are co-authors, including 2 journal papers and 6 conference papers), and another conference paper with undergraduate students. High quality mentoring has also been demonstrated through the journal and conference venues that my students have published in, as elaborated in Section 3.2 and in my *Scholarly Activities Statement.* My students won a best presentation award, the NAU Presidential Fellowship, and co-founded a robotics startup company in the US. My former MS/BS students have become PhD/MS students in prestigious graduate programs in the US.

I have also worked on program assessment and development through activities including ABET accreditation, EE curriculum review and improvement, a proposal for enhancing our PhD in Informatics & Computing (PhD INF) program, development of a new emphasis area in ECE in the PhD INF program, and other efforts such as a new certificate program in semiconductors. Furthermore, I co-organized the SICCS Graduate Recruitment Weekend in 2020, have performed various student-related and mentoring activities, and have been on 5 MS/PhD exam committees for students advised by my colleagues.