Teaching has been part of my identity since high school. Starting with private tutoring opportunities during my teens, I have always felt attracted to passing on knowledge to my students and peers. In my last year of high school, I considered applying to an education program at university since I enjoyed teaching and received positive feedback from my students. I have gradually developed my teaching philosophy through undertaking various teaching roles in undergraduate and graduate school.

Teaching Philosophy

My teaching philosophy is based on three pillars: ***cohesion***, ***applied teaching***, and ***student engagement***. All three are essential for a successful transfer of knowledge to students; albeit there are differences in how these are applied to undergraduate and graduate classes. I have built these teaching principles through my experience as both a student and teacher in the past 8 years. Every individual has a different learning style that has to be acknowledged and nobody's teaching philosophy can be a *one-size-fits-all* approach. Nevertheless, during my past teaching experience, I tried to understand and adapt to my students' learning styles. I will explain the aforementioned three teaching principles as follows:

Cohesion: I have always found it helpful if the teacher went over the syllabus in the beginning of the class to provide an overview of the course content. I am a big proponent of showing my students the *big picture* of the class content and how each learning unit/chapter will interact with each other. For instance, one of the classes I have enjoyed most during my undergraduate degree of Electrical and Computer Engineering at TU Munich was EI00330 Signal Theory. Although the content might seem a little dry and too theoretical for the average student (I am not a big fan of theoretical classes either), I found the teaching philosophy of the instructor extremely inspiring. During his first lecture, he briefly explained what signals are and that the class is going to distinguish time and frequency domains, as well as continuous and discrete signals. Each chapter was basically teaching a combination of these two categories. At each time during the course, I knew where we were standing under the umbrella of the big picture which prevented me from losing interest in the dry mathematics and eventually falling behind. The professor taught me the teaching principle of ***cohesion***. After successful completion of the course, I was offered a role as Teaching Assistant (TA) which I used to develop my second teaching principle of ***applied teaching***.

Applied Teaching: It is very important to create excitement in students to achieve inclusion. I understand that one cannot be excited for every course. Some students naturally have an easier time with a certain course due to their interest in it. I was a very good student during my undergraduate degree and was privileged enough not to have any personal or societal reasons that held me back from focusing on my classes. Nevertheless, I struggled in certain courses due to my lack of interest in them. Reflecting back, I gradually realized a pattern in those specific courses: (1) In classes with instructors trying to motivate students by showing real-world applications and going through sample questions after teaching a concept, I performed well, even if the topic was boring to me and had no potential use on my future career; (2) In other courses, the instructors simply covered technical concepts without demonstrating its implications or uses in the real world. No sample questions were provided to embed the taught concept in an applied scenario which made me question the usefulness of the concepts and eventually the class. As a result, I lost interest quickly and underperformed despite putting in a great deal of time and effort. Hence, I think that ***applied teaching*** can alleviate the fundamental problem of non-inclusion. I have always embraced this teaching principle in my roles as TA. After summarizing the weekly content from lecture, I would solve a sample questions on the blackboard. These questions would be embedded in a context so that my students could understand where engineers would use the concept in real life. Then, I would provide students with "transfer questions" — incremental questions that are similar to the taught concept, but require the students to *really* understand the problem in order to solve it. Finally, I would like to underline that ***applied teaching*** is more of a concern for fundamental undergraduate-level classes. The majority of undergraduate students are poised to go to industry and real-world applications will be beneficial to them in their jobs. Elective graduate level courses will usually feature motivated students for that area and the teaching approach will shift more to a project- or paper reading-based curriculum.

Student Engagement: No matter how cohesive you structure your content and accompany it with examples and real-world applications, a good teaching philosophy cannot be complete if there is a lack of communication with students. Some students might be generally reserved in interacting with the class and/or instructor, others might be off-put by the teacher not talking to the audience. This could lead to the instructor not being able to assess if students are following the lecture. Hence, I believe that it is very important to show to my students that I am there for them so they can engage with me. For instance, I will periodically ask them during lectures if anyone has questions. From my past teaching experience, I feel that students are more willing to come forward with questions or follow-ups when I give them both verbal and physical signs. Another way to poll the students' understanding is to ask them conceptual questions. Usually, some students will want to respond to that question which creates a more engaging and inclusive environment. Last, but not least, I feel it is very important to learn the names of each student (in smaller classes). This is especially useful when engaging with them in on-on-one conversations, e.g., in office hours. Students will see me as a multi-dimensional person who cares to get to know them better and it will lead them to engage with me more frequently.

Teaching and Mentoring Experience

My undergraduate and graduate teaching experience have prepared me to be an effective teacher. During my Bachelor's at the Technical University of Munich (TUM) in Germany, I was a TA for four courses in the Department of Electrical and Computer Engineering (ECE), namely EI00330 Signal Theory, EI00340 Stochastic Signals, EI00210 Electricity and Magnetism, and EI00110 Computer Architecture and Programming. My teaching duties included conducting the German equivalent of weekly discussion sections. As mentioned in my teaching philosophy, I summarized the weekly concepts to a small group of students, showed them how to solve sample questions on the blackboard and provided them with more sophisticated "transfer questions". I also conducted exam review sessions and designed mock exams for some of those courses.

During my Ph.D. at the University of Michigan, I acted as Graduate Student Instructor (GSI) for my Ph.D. advisor's graduate-level course EECS571 Principles of Real-Time Computing. One of my duties was conducting one-hour discussion sessions on most Fridays to both deepen the concepts of scheduling theory by showing examples, as well as teaching novel related concepts that have been briefly mentioned during lecture. For instance, I designed an entire discussion hour on the effect of direct-mapped caches on the worst case execution time of tasks. Furthermore, I had the privilege of designing an entire lecture note from scratch on in-vehicle networks and teach it in a 1.5 hour lecture. My other responsibilities were designing and grading homework, as well as exam questions. Together with the professor, I advised students during their research projects and gave them constructive feedback based on my research experience. Finally, I held office hours twice a week, which were usually very well attended. My midterm evaluation is attached to this teaching statement.

Another highlight of my teaching experience was mentoring both undergraduate and graduate students over the past three years [2]. I had the chance to work with 15 undergraduate and two Master's students on a total of eight research projects. Although some research projects were exploratory and have been abandoned since, we published two top-tier security papers and currently have three in preparation/submission. In fact, my positive experience of mentoring students in research was a key factor as to why I started considering academic positions two years ago. Frankly, I also made mistakes in the beginning (e.g., not keeping meetings on track regarding time) and there is still room for improvement. I have also attached two students' feedback on their research experience with me to this statement.

Teaching Goals

Since I studied in both Germany and the United States, I also had the chance to see both education systems and how they compare to each other. The vast majority of undergraduate and graduate courses in Germany were teacher-centered and consisted of a final exam only. On the other hand, undergraduate and graduate courses in U.S. are heavily homework- and project-based, with the contribution of written exams to the overall grade less significant than in Germany. I saw several advantages of the U.S. system, but would consider the German curriculum more rigorous. Exam questions would poll the understanding of the class by asking "transfer questions" instead of resembling homework questions. As a result, I would like to incorporate and combine aspects from both the U.S. and Germany and apply it to my own courses.

Undergraduate Classes: The courses will generally consist of periodic homework sets, individual or group projects, midterm and final exams. I would like to avoid grading students' attendance since I want an inclusive environment and understand that not every student can always be physically in the class (e.g., due to personal reasons, COVID-19, etc.). Due to my teaching and research experience, I feel confident teaching undergraduate level classes on computer networks, security and architecture.

Graduate Classes: From my education and recent teaching experience, I found that teaching graduate courses requires a research-oriented approach comprising three components. First, I will focus on research paper reading and critique. Every week, I will cover a different subset of the large research area and assign recently published or other influential papers to students. The teaching principle of *cohesion* will be satisfied since for each graduate course, I will conduct and present a taxonomy of the research area. Second, students will choose research projects that will be conducted in a group, emulating a real-world collaborative research environment. During the execution of the project, I am going to assist them by engaging in one-on-one discussions to develop their initial idea or give them feedback about concerns or possible roadblocks. Students will also be required to give presentations on their research project which leads me to the third component — presentation skills. In my opinion, this is one of the most important soft skills for any engineer or scientist. I would like to develop students' oral and written presentation skills by teaching them to communicate their work to a larger audience and how to offer/receive constructive feedback from their peers.

I plan to create and offer my own graduate-level course in automotive security and privacy. The course will expose students to research problems in connected and autonomous vehicles. The course is going to teach two weeks of essential vehicle basics, including in-vehicle networks, vehicle-to-everything communication, driver assistance and infotainment systems. This will be followed by reading influential research papers. For the research project, I plan to provide students

development kits from German startup ELEXIR [1], consisting of both automotive Electronic Control Units, as well as the software stack. This testbed can be also used by my Ph.D. students for thesis research.

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1. *Doing examples really help reinforce new content/content from lecture. I found it helpful when we went over common questions/confusions students had from office hours.*
2. *The discussion sections are most useful.*
3. *Discussions in office hours are really helpful.*
4. *Mert has done a wonderful job converting difficult concepts into intuitive and easy to grasp explanations. The discussion sections he runs have been very useful for applying the theory covered in class to assignments and real–world examples.*
5. *He is a funny and patient man.*

Mentored Students Feedback

Student 1: *I learned a tremendous amount from you the last two years working in the lab. The ownership and data analytics skills I learned the past two years have already proven to be extremely useful in my job and classes. One of the main technical things that I learned while working with you was analyzing data and making decisions from it. Throughout both projects the analyzing data was a key component. The data analytic skills I learned go beyond any given statistical test and will allow me to confidently make the right decision with data to back it up. I think one of the main contributors to this skill was your ability to clearly explain your own thoughts while making decisions and providing the framework as to how you make decisions.*

Student 2: *Things that worked well: Having weekly status update meetings to keep everyone on track and coordinate work. Helping us set weekly progress goals (again, to ensure we're on track to meet deadlines). Clear objectives (submit to conference X by date Y). Helping ensure we received academic credit or payment for the time/effort spent on research. Providing concrete feedback on work done each week.*

Things that could be improved: Micromanaging development: more telling students what to do and less of exactly how to do it (unless absolutely necessary). Keeping meetings on track in terms of duration and content. Plan work sessions in advance, instead of having a status update meeting devolve into a work/troubleshoot session.

References

[1] Elexir. Elexir. https://www.elexir.eu/en/tech/.
[2] Mert D. Pesé. https://web.eecs.umich.edu/~mpese/students.html.