

# Statement on Teaching, and Learning

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## 1 EXPERIENCE

I have teaching experience for 3 academic levels; graduate, undergraduate, and high school.

**Graduate:** In Spring 2021, I was a teaching assistant (TA) for CS244, Advanced Topics in Networking, at Stanford instructed by Sachin Katti and Nick McKeown [4]. It is a small (25 students) graduate-level class that discusses must-read publications in the area of networking systems. It ends with an unusual final project where students reproduce the results of a paper from the literature. As they got into the non-deterministic environment of research, I was there to mentor them. I helped them identify the challenges of research and develop the skills for reproducing work. For example, I published a tutorial for the widely used NS3 (Network Simulator 3) tool to use in their projects [1]. When students received unexpected results, they reached out to the authors of the original work and discussed the issues as researchers. Seeing them engage with the community was certainly a gratifying experience.

**Undergraduate:** My other TA experience was CS144, Introduction to Computer Networking, at Stanford in Autumn 2020 [3]. It was an undergraduate-level introductory class with nearly 250 students instructed by Keith Winstein and Nick McKeown. Students learned the fundamental topics of networking from pre-recorded videos and discussed them during the lectures. In the meantime, they built their own TCP stack with weekly programming assignments and I held office hours to discuss edge cases, bugs, or optimization challenges they faced.

**High School:** I was a volunteer section leader in CS Bridge during the Summers of 2016 and 2019 [2]. It is a special program that teaches an accelerated version of Stanford's CS106A, Programming Methodology, to high school students around the world. As a section leader, I closely worked with 10 students each year and gave lectures on basic programming concepts. It was very inspiring to see the creative methods used by the instructors, Chris Piech and Lisa Yan, to deliver the content of a college class to a different group of learners. Since then, I have been constantly looking for such creative ways to make my classes more fun and engaging as well.

In addition to teaching in classes, I am mentoring Alexander Joseph Waitz. He is an undergraduate student at Stanford exploring the area of systems research. I have been teaching him different topics in the field to help develop an understanding of current research directions and hot areas.

## 2 FUTURE PLANS

I believe I am equipped well to teach **networking systems courses both in the undergraduate and graduate levels** in addition to **introductory programming courses**. Similarly, I could use my electrical engineering background to offer **undergraduate-level signal processing and digital systems courses**. I seek to expand this spectrum with **new courses** that focus on hot topics in the field such as systems for machine learning, next-generation telecommunication networks, cloud computing, or IoT.

I also would like all my courses to cover the ethical aspects of the subject matter which is crucial for training the engineers, scientists, and leaders of the future. In addition, I plan to dedicate the last week of the courses I teach to the state-of-the-art in the field even if it is an introductory course. This helps students get inspired about the topic and stay motivated to continue their learning. After all, the best scientists, engineers, and leaders are the ones who do not stop learning.

### 3 TEACHING PHILOSOPHY

In my experience, an interactive and thought-provoking class substantially helps students go beyond the textbook knowledge. It allows students to engage more with the topic as well as the community around it rather than memorizing the content. It also solidifies the learning process and even encourages students to take an active role in advancing the subject matter. I am inclined to create this environment in my future classes mainly with the four strategies described below.

First, I will focus on having a receptive and sociable teaching staff including the instructor as well as the TAs. When the students are intimidated to ask questions in class or participate in group activities, they are likely to get stuck at applying their knowledge to problems. These problems tend to be unprecedented and highly dynamic when students dive into real-world scenarios. Making the students feel that they are supported throughout this process raises their confidence and motivates them to take steps forward. This was also reflected in one of my TA evaluation surveys:

*"Serhat was always approachable and kind! I always felt comfortable asking him questions about the content and going to his office hours."*

Once an open communication channel is built with all the students, I will utilize this channel to encourage students to draw conclusions from their own solutions. This way, they will be aware of the positive impact they can make with the things they learned. Sharing my experience with the subject matter rather than just talking about the textbook content is a good strategy for this. For instance, I always try to use analogies as much as possible while explaining a subject, i.e., Internet working like the postal service or congestion control mechanism in data centers being similar to traffic lights for vehicles in streets. When selected carefully to apply to the student's life, such analogies let students correlate what is being learned in the classroom with their life and possibly associate their own experiences and emotions with the topic being studied.

*"[Serhat] explains concepts in an accessible and clear way, and responds non-judgmentally even when we ask basic questions."*

Next is equipping the students so that they can *evaluate* solutions for the problems studied. I plan to achieve this by turning students into teachers in the classroom, i.e., via group activities or student presentations in class such as the ones in CS244. This way, students are motivated to collect inputs from other students, think about the edge cases, and advocate for the main insight of the topic.

Finally, I value collecting feedback about the progress of the students and the outcomes of the class. Such feedback can frequently be collected via anonymous surveys, routine class assignments, or more advanced conversations about the subject matter during office hours. I plan to use this feedback for course-correcting the structure of the class based on the pace, interest, and workload of the students. As the class is customized to the existing students, the efficiency of the teaching will be maximized, i.e., the CS Bridge program.

*"[Serhat] cared both about your learning in the course and how you were doing overall."*

### REFERENCES

- [1] Serhat Arslan. 2021. Introduction to NS3 (Network Simulator 3). [https://www.youtube.com/watch?v=Jv\\_swgcykjQ](https://www.youtube.com/watch?v=Jv_swgcykjQ)
- [2] Stanford University. 2023. CS Bridge: A cross-university program by Stanford. <https://csbridge.stanford.edu>
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- [4] Lisa Yan and Nick McKeown. 2017. Learning Networking by Reproducing Research Results. *SIGCOMM Comput. Commun. Rev.* 47, 2 (may 2017), 19–26. <https://doi.org/10.1145/3089262.3089266>