

# Teaching Statement

Pramod Ganapathi

My major teaching goal is to **train undergraduate students in practical problem-solving, train graduate students in algorithmic thinking and research, make students fall in love with learning, and write research-based books to teach mathematical and algorithmic problem-solving.**

My very first experience in teaching was when I became a **Teaching Assistant for four undergraduate courses** during my Ph.D. program. I taught mathematical problem-solving for Foundations of Computer Science (Honors) and was in charge of grading exams, holding office hours, and proctoring exams for the three courses: Theory of Computation, Computer Science A (Honors), and Theory of Computation (Honors). The major technique I used while teaching is *posing a challenging problem, initiating a discussion to generate ideas, appreciating student-efforts at every stage, giving enough hints for students to crack the problem, and in the worst-case, sharing the solutions and problem-solving techniques one-by-one.* I also discussed which techniques work and which don't and why. In assignments, I gave extra points for expressing any kind of critical thinking or creativity. The students liked this approach because they got a personal learning experience.



Figure 1. Left: My undergraduate students. Right: Stony Brook Puzzle Society session.

I had a rare opportunity to teach mathematical and algorithmic problem-solving to some of the brightest Ph.D., master's, and bachelor's students for three years for absolutely no credits, through an organization I founded called **Stony Brook Puzzle Society**. The pedagogical approach I implemented to inject problem-solving incorporated the *Socratic method of questioning, discussions, and argumentation* and the *western style of critically analyzing pros and cons of all existing solutions* for solving a given puzzle. True to the Roman philosopher Seneca's words, "While we teach, we learn", I learned more in the name of teaching. I realized that a teacher is nothing but a professional student.

I was lucky to get an opportunity to **advise eight master's and two bachelor's students** on research projects. I used the divide-and-conquer algorithmic technique to split a big chunk of research task into easily solvable smaller chunks of specific tasks so that the students could finish those small tasks within given timeframes. I tried to give more freedom and directions to self-motivated students and get work out of students who did not work hard. I also guided the

junior Ph.D. students in our lab. Some of the master's and bachelor's students I advised worked hard so as to become co-authors in three refereed research papers.

Chasing my then 10-year old dream of revolutionizing the education system, I returned to India after completing my Ph.D., studied extensively on various topics, and founded a startup called *Learning is Beautiful*. The aim of the company was to create entertaining animated videos on highly practical ideas from the most important topics in life and the world. For example, business could be taught through real-life case scenarios, psychology through psychological experiments and situations, personality development through stories, algorithmic problem-solving through problems and multiple solutions, law through supreme court cases, life partner search through gems of wisdom, parenting through real-life scenarios, and so on. Due to the startup's strong vision, practical business plan, and a working proof-of-concept, the startup was selected by the Government of India as one of the *top-3000 startups to transform India*.

When I become a full-time teacher, I would like to implement various effective teaching techniques such as: *motivating and inspiring, telling stories, bringing drama into teaching, sharing lots of examples, solving puzzles, giving practical applications, involving students in discussions and teamwork, teaching ideas through visualization, having student presentations, and making students implement and code everything*. I will strive hard to correct my negativities and limitations from the feedback I receive from students. I believe in the following advising methodology. Undergraduate students must be exposed to hundreds of practical problems and solutions. They must be trained to perform rigorous literature survey, critically analyze the existing results, come up with a few ideas, collaborate with team members, and write neat summaries. Graduate students must be trained to design new algorithms using existing problem-solving techniques, write papers and detailed technical reports, and create beautiful presentations. Doctoral students must be trained to identify/create high-impact problems, discover elegant problem-solving techniques/methodologies, peer review research papers, and write grant proposals with their advisors. The power of a great teacher is rightly communicated through Nobel laureate Malala Yousafzai's words "One child, one teacher, one pen, and one book can change the world."

I am particularly interested in teaching the following undergraduate/graduate courses. Theoretical Courses: (Core) *Discrete Mathematics, Algorithms, Data Structures, Advanced Algorithms*, (Elective) *Algorithmic Problem-Solving, (non-conventional) Real-life Algorithms, and Computer Organization*. Programming Intensive Courses: (Core) *Parallel Algorithms, Database Design, and* (Elective) *Programming Algorithms*. After a few semesters/years, I would also like to teach (Core) *Distributed Algorithms, Distributed Systems, and Machine Learning*.

It would give me unparalleled joy to get an opportunity to help students in making the world a better place to live.

TA Evaluation  
Pranav Ganapathi

CSE 150: Foundations of CS: Honors

### Positives

- Marks-up homeworks and gives good feedback on mistakes
- Explains well, in class, why something is NOT the answer
- Friendly and knowledgeable

### Recommendations

- Give time to think of approaches at start of problems

### Negatives

- If a problem is not already understood, the reasonings could be better explained (i.e. why this is the answer)
- Redundancy in office hours (held simultaneously as Dr. Bachmair's on Wednesday)

I think your teaching is truly excellent especially since you patiently take the time to understand our questions and explain possible difficulties in such a way of thinking compared to another method → this definitely helps to encourage a necessary kind of critical thinking.

There is nothing much I can really suggest, except that if we could do just a few <sup>more</sup> proofs to get a handle on proof-style thinking, that would be great. I find that it is often difficult to start or sometimes there is one small detail that makes all the difference, and with practice it will be easier to spot.

Figure 2. My students' feedback on my teaching.