

# Teaching Philosophy and Interests

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## Subjects I have enjoyed teaching

Discrete Mathematics, Data Structures, Algorithms, Programming/Problem Solving, Quantum Computing, Cryptography, Theory of Computing (Languages, Automata, Computability), Algebra, Trigonometry, Calculus

## Subjects I would enjoy teaching

Combinatorics, Graph Theory, Coding Theory, Computational Algebra, Abstract Algebra, Group Theory, Introductory Number Theory, Matrix Theory

## Why I teach

Since I first taught a course as a graduate student in 1992, I have known that teaching would be a significant part of my career. I believe my strong passion for teaching is a major contributor to my success. Students give me positive comments on my teaching, and my teaching evaluations are usually above the department/institutional average. I have also received several teaching awards, including an inaugural Computer Science and Engineering Department Award for *Outstanding Teaching of Lower Division Courses* for 2002-2003 (UNL).

I take my role as a teacher so seriously that each semester I ask my students to be very frank on student evaluations, telling them I will not continue teaching if I am not doing it effectively. I constantly reevaluate every course I teach for improvement. I carefully read every student evaluation to get a sense of what I did well, and what needs to be improved.

## How I Teach: General

I strongly believe that the keys to learning are motivation, perseverance, and the right resources. Although a teacher has limited influence on motivation and perseverance, being interested, engaging, and available can certainly help. Providing the right resources, include textbooks, supplements, and course staff are very much under the control of the teacher. Therefore, I carefully select the textbook(s), and create and/or find supplements when needed. I also ensure that teaching assistants and/or graders are well qualified to assist in the delivery of the course.

I start each course with a discussion of things that will help the students succeed in the course and in their major, and explain that the best possible experience will be had by those whose focus is on learning and applying, not an getting a certain grade.

To learn, students need to read, listen, participate, and practice. Therefore I take an approach to teaching that asks students to prepare for each class by reading one or more resources, listen and participate during each class, and complete practice problems before and/or after class.

A course is not simply about learning a set of topics, however. It is important that students are able to apply what they learn more broadly and communicate what they know in a variety of media. Therefore I incorporate application and communication into the class periods and assignments where possible. I create graded assignments that include repetition, problem solving, application and communication, as appropriate for the particular subject.

## How I Teach: Specifics

Specific things that I have been doing for years which have worked well include the following:

- I treat students as equals. I usually allow them to refer to me by my first name, I do not claim to know everything, and I am willing to admit when a student is right and I am wrong. This gives students more confidence in themselves, and encourages them to ask questions without fearing I will make them feel inferior.
- I bring my sense of humor into class. Since this puts the students at ease, it allows them to learn better, and certainly makes the environment more conducive to student participation. The interruption of a lecture with the occasional joke, story, or anecdote seems to help students achieve more than the average attention span of 11 minutes.
- I use an active learning approach so that students are more prepared coming to class each day. I replace mundane lecture with interesting examples, applications, and student interaction. I encourage students to ask questions over the reading or exercises, ask them to help me solve problems, and give them scenarios to see how they use what they have learned in new situations.
- I incorporate group activities such as worksheets or discussions during class when the time/topic permits. I create assignments that encourage helpful collaboration but allow accurate individual assessment.
- Although I encourage students to see me during my office hours, I also make time to see students when *they* are available.
- I have very high standards for students, pushing them to achieve more than they believe they are capable. Students who receive an “A” in my courses know they earned it.
- I use technology in the classroom when it has legitimate value. For instance, displaying algorithm animations; writing, testing and debugging code; showing useful websites related to the course material; and viewing online lecture notes.
- When I give term projects, students are given much freedom to pick a topic and project type they will enjoy the most. This increases their interest in the content and should increase their retention of the subject matter after the course has been completed.
- Each course I teach has an extensive web page containing a detailed schedule, course supplements, assignments, links to resources, grade book, etc. Motivated students have no shortage of resources and information at their disposal.

## Integrating Research and Teaching

I believe it is advantageous for all students to be exposed to research, even if they are unable to actively participate. Therefore, I discuss my research in courses when appropriate. For some course this is limited to a few comments or a single lecture. In other courses, particularly those related to data structures and algorithms, I include assignments related to ongoing research when possible. As an example, I asked students in a recent algorithms course to attempt to find a graph and pebbling configuration with a particular property, the answer to which was unknown at the time. In the next offering of the course I plan to ask students to design and implement a graph-based game related to an NP-complete problem of their choice using the framework my research team has been developing.