

# TEACHING STATEMENT

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## TEACHING PHILOSOPHY

My primary goal in teaching is to empower students with self-confidence through the realization that knowledge has been gained and can now be drawn on to solve practical problems. Since computer science is, in my opinion, inherently applied, the ultimate evidence of successful teaching is the students' mastery of the presented material and their ease in its implementation.

I strive to follow two main teaching strategies: (i) maintain focus throughout the course, and (ii) supplement lectures with ample hands-on assignments. My experience has shown me that overwhelming students with a myriad of new material obscures essential concepts. Key ideas should be brought to the forefront as soon as possible and reinforced through practical exercises. I believe the best way of learning is by doing, i.e., there is no better way to fully understand an algorithm than to design and implement the corresponding program.

## RESPONSIBILITIES, STRATEGIES, AND OBJECTIVES

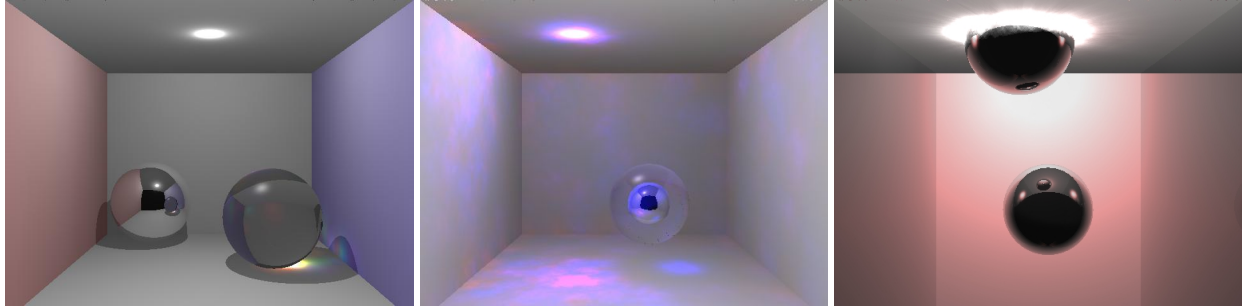
My teaching portfolio at Clemson University consists of the courses listed in the table below. Most recently I have been involved in teaching introductory courses in Clemson's Digital Production Arts program. This program is at the pedagogical crossroads of Computer Science and Art, where the goal is to train students to fill Technical Director positions in the film industry. I would be happy to continue teaching similar course offerings.

Course	Level	Course Description	Semesters Taught
CPSC 102	U	a course on C programming	F10 <sup>†</sup> , S13
CPSC 212	U	a course on data structures and algorithms	F06 <sup>†</sup> , S11, F11, S12
CPSC 215	U	a course on C/C++ programming under Unix	S01 <sup>†</sup>
CPSC 405/605	U/G	a course on computer graphics	S99–S02, S04, S06
CPSC 412/612	U/G	an interdisciplinary course on eye tracking methodology	F99 <sup>†</sup> , F00–F16
CPSC 414/614	U/G	a survey course on Human-Computer Interaction	S02 <sup>†</sup> –S07
CPSC 481/681	U/G	a course on 3D game programming	S05 <sup>†</sup>
CPSC 805	G	an advanced course on computer graphics	S98, S99, S03, S08, S10
CPSC 808	G	an advanced course on computer animation	S00 <sup>†</sup>
CPSC 815	G	an advanced course on digital effects production	F99 <sup>†</sup> –F03
DPA 400/600	U/G	an introductory course on digital production arts	F16
DPA 401/601	U/G	an introductory course on digital production arts	F15, S16

<sup>†</sup>Newly developed.

In general, I have chosen a teaching style where initial concepts are presented through the aid of analogy and example. Once received, these lessons are then generalized to abstractions, where appropriate, hence I sometimes start “bottom-up” instead of “top-down”. Further extension and use of abstract notions are then again derived through examples. I emphasize good programming design and good programming habits, and above all, I attempt to motivate students to think logically. I do not shy away from rigor and difficult concepts in the classroom, although this strategy is not always well received by students. I am comfortable with the collection of courses I have developed, particularly my interdisciplinary course on Eye Tracking Methodology, which I teach to students from Psychology, Industrial Engineering, Marketing, Packaging Design, as well as from Computer Science. I also enjoy teaching Computer Graphics at both undergraduate and graduate levels, as well as Human-Computer Interaction. I have utilized the following teaching aids:

- email for instructor-student communication,
- web pages for class notes and assignment distribution,



(a) Students' work, left-to-right: Jason Anderson, Daniel Willard, and Shi Zheng.

Figure 1: Example images from Fall 2011 and Spring 2012 CPSC 212: Data Structures and Algorithms.

- liberal use of abstract visualization techniques (i.e., drawings and sketches for data structure depiction),
- demonstration on my laptop in smart classrooms.

## STUDENT EVALUATION

I consider student evaluations to be of prime importance to the improvement of my teaching abilities. I encourage student participation in class, and I pay special attention to student comments during and after each course. I am always ready to adapt my teaching style to student feedback. Two aspects that appear to be consistently evaluated at a high level by my students is the amount of work and its difficulty. This stems largely from my emphasis on project-based learning. My graphics courses, at both undergraduate and graduate levels, maintain a heavy workload throughout the semester. A good example of a project-based workload was the  $\tau\acute{\epsilon}\chi\nu\eta$  version of CPSC 212 wherein I taught sophomore undergraduates how to convert their ray tracer, written during the semester prior, into a photon mapper [2]. Exemplar images are shown in Figure 1. Jason Anderson's Cauchy-based refraction was especially impressive, particularly since that concept was not discussed in class and he investigated the approach independently. He is now pursuing his Computer Science PhD.

## COURSE EVOLUTION

Courses that, in my opinion, are a fairly good reflection of my teaching abilities and preferences, as the material corresponds well to my research interests, include: Eye Tracking Methodology (CPSC 412/612), Introduction to Computer Graphics (CPSC 405/605) and Advanced Computer Graphics (CPSC 805), as well as Human-Computer Interaction (CPSC 414/614).

As a result of my Clemson University Innovation and NSF CAREER research awards, I introduced the eye tracking course (CPSC 412/612) in the Fall of 1999. I have refined both the subject matter for the course as well as my teaching style to reflect the somewhat unusual interdisciplinary makeup of the class. Students from Industrial Engineering, Marketing, Packaging Design, and Psychology form teams such that each team has at least one member from Computer Science. The team construct reflects my own approach to research, one that to a large extent relies on collaboration. The course is research-oriented, centering on a semester-long experiment culminating in a term paper written by the team and made to resemble a conference publication. Thus the course is run as a small conference, where instead of the final exam, student teams present their papers (in effect, all papers have been "accepted" to the conference following peer review). This approach has been particularly well received by graduate students in the class as some have gone on to publish their results in actual conferences following the conclusion of the class (e.g., EuroGraphics Symposium on Virtual Environments [5], Graphics Interface [1], Symposium on Applied Perception in Graphics and Visualization [4], Eye Tracking Research & Applications [6], and Transactions on Applied Perception [3]).

Beyond eye tracking, I also thoroughly enjoy teaching an introduction to computer graphics, CPSC 405/605. The course may carry a “tough” reputation among students although it appears to attract relatively large audiences. Perhaps my greatest success story thus far is of Zach Cole, a student who, at the end of the course, professed that he had finally found “his calling” and that computer graphics was the career direction he was looking for. On my suggestion, Zach went to SIGGRAPH where he conducted interviews and eventually landed a job at Industrial Light & Magic (ILM) in California. A position at ILM is particularly difficult to obtain, and I am therefore gratified that Zach was able to achieve this success. He and his ILM team received an Oscar award for lighting on *Pirates of the Caribbean: Dead Man’s Chest*.

## CLOSING STATEMENT

I strongly believe in the dual functions of a university as a research facility as well as an educational institution. I take the responsibility of teaching very seriously and I put forth the best teaching effort that I am capable of at each stage of my professional career. I enjoy teaching and I look forward to improving my effectiveness as an educator.

## References

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- [5] D. Vembar, N. Iyengar, A. T. Duchowski, K. Clark, J. Hewitt, and K. Pauls. Effect of Visual Cues on Human Performance in Navigating Through a Virtual Maze. In *EuroGraphics Symposium on Virtual Environments (EGVE)*, Grenoble, France, June 8-9 2004. EuroGraphics.
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