# Statement of Teaching Philosophy

I believe the true environment of learning is not result-driven, and the best teaching is being able to create an environment where learning is motivated, instead of enforced. For me, an essential part of education is to enjoy learning, and preparing students for a life-long journey of learning inside and outside the classroom.

This has been my core philosophy throughout my interaction with students, from hosting discussion sessions and office hours, mentoring students, to teaching classes.

**Constructing an interest-driven learning environment**

I taught the undergraduate class, "Special Projects in Astronomy", at the University of Maryland, College Park. It was an intermediate-level course for astronomy/physics majors to learn about research methods and techniques through hands-on experiences. The class is usually taught by Goddard scientists who design the class based on their own research expertise. As long as I covered basic research process and tools, such as proposal/paper writing, programming, statistics, and have students perform a research project at the end of the class, I had complete freedom to design the class.

Instead of having students do a pre-designed research project, I decided to have students construct their own research proposal at the beginning of the semester, which later became the research project that they carried out at the end of the semester. Although there are certainly challenges for a sophomore/junior students to come up with their own ideas on a topic that they just learned for a month, I decided to go with this strategy since (1) it is at the core of doing research to come up your own idea, and (2) I believe students will be more interested in carrying out an idea of their own and that they are interested in, and thus will care more and learn more about the project when actually performing it.

In order to assist students to write their first research proposal, and construct a project that is feasible to complete in about a month, I included the following two events in addition to the usual class material:

1. I had a special activity for students to mimic a real "proposal review committee" and discuss/review two proposals that I assigned them to read the previous week. These two proposals were real proposals submitted to the Guest Investigator Program of the Neil Gehrels Swift Observatory (these are actually my own proposals). In reality, one proposal was accepted, and one proposal was rejected. But the students did not know the real outcome of these proposals, nor do they know who wrote these proposals (so they could feel free to criticize them). Students had to write a review to each proposal prior to class, and discuss the strength and weakness of each proposal during class. The discussion in class followed exactly the same procedure as the real panel review meeting, and was completely led by students. My job was to be their executive secretary: write and collect scores that they gave to each

proposal. I only interrupted occasionally to make sure quieter students have enough chances to participate in the discussion.

2. After attending the class for the mock review panel, students started to construct their own proposals. These proposals are reviewed in the exactly same manner and standards as what they did in the mock review panel class. The only addition is that I would also write a session of potential revision to make it into a feasible semester project.

All students were very active in the mock review panel with interesting discussions. Students came to similar conclusions as the real reviews. In addition, I got some very useful suggestions to improve my proposals. Toward the end of the semester, almost all the students work hard on their projects and actively searching for creative methods to achieve better results. About half of the class constantly showed up during my office hour when they are working on their project. Discussions with students about their projects were inspiring as they often brought up new aspects to the projects.

I learned through this teaching process that it is usually very effective and easier to get people interested by including some real-world examples. I plan to include my experience as a research scientist and my work with the space telescope to the class material. For example, I would use real data from the Neil Gehrels Swift Observatory when teaching classes about statistics. I would also use the image processing algorithm that is adopted on the Burst Alert Telescope as an example to teach Fourier transform.

**Teaching to students with different learning styles**

Through my experiences with students, I found that being able to identify and incorporate different learning styles is crucial in interacting with different students. For example, while some people learn best working through problems themselves, others learn better through active discussions. Although in a large class, it is sometime difficult to select a strategy that works well with all the students, I found that it is important to get to know the students in class, and adjust the teaching accordingly. At the beginning of the semester, I hand out questionnaire to learn more about their academic background (majors, years, relevant classes they have taken, and the reasons that they would like to take this class), I also incorporated some class activities/discussions at the beginning of the semester to help me get to know the students, and to get them familiarize with each other and be more comfortable interacting with me.

When possible, I also try to incorporate more than one way to convey the information to reach to students that learn differently. For example, when teaching blackbody radiation, I will go through the basic mathematical derivation (for students who learn though listening), include reference readings and questions that they can work through themselves after class (these are not necessarily homework assignments, but for students who learn through reading themselves), present animated plots (for students who learn through visualization), and have some in-class activities and discussions (for students who learn

through interactions with others). In order to keep the class focused, I give different weights to these methods based on students' background in each class.

**Mentoring students**

For students that are particularly motivated beyond the classroom, I have developed many research projects for students who are interested in further research experience. I have mentored ten undergraduate students and one graduate student since summer 2014. These students came from a wide variety of backgrounds, majors (physics, astronomy, computer science, and engineering), and universities (including the George Washington Universities, University of the Virgin Islands, University of Maryland at College Park, Harvard University, University of California, Berkeley, and the Georgetown University).

Overall, I have found that a successful undergraduate research project needs to have the following criteria:

1. The project needs to be able to finish in a time scale of a few months (i.e., a summer or a semester), and has clear steps and goals. Goddard summer interns will present their results at a final poster session, and the research schedule is thus tailored to match this timeline.
2. Since the research needs to be finished in a few months, I found it necessary to meet with the students more frequently (a few times a week), and make sure students feel comfortable to stop by my office at any time.
3. It is important to connect the research project to the bigger picture. While student might spend most of their time working on some detailed part of the codes, it helps keep student interested and motivated to know how their work fits in to the final project/paper and answering important questions in the field.
4. Involving techniques that can be applied to a wider career path, such as statistics, programming, presenting, and writing.

I look forward to continue my research with students at XXX college. When possible to perform summer research off site, I am interested in applying for research funding to bring students with me to Goddard, where students will be able to have further interactions with astrophysicists and engineers, and obtain first-hand experience of working with space telescopes.

**Summary**

My teaching philosophy aligns well with the general ideology at a liberal art college that envisions a broader education beyond a career-driven curriculum. I wish to have the opportunity to contribute and enrich the experience for students at XXX college.