TEACHING STATEMENT

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1. Teaching Philosophy

In my time as a mathematics student, tutor, graduate assistant, and visiting professor, I have learned many things about teaching mathematics. Throughout this time a few concepts have become central to my teaching philosophy:

- Students respond to the expectations set in the classroom;
- Students need to be able to see a clear path for success;
- Students need to be shown the usefulness of the skills they are developing;
- Mathematics classes need to emphasize the process of getting an answer as much as the answer itself.

These four observations have been the foundation upon which I run my classroom.

**Students respond to the expectations set in the classroom.** Setting expectations for students is the first step in designing a class. Expectations are set early in each semester and resonate throughout the entire course. It is unfair to change the expectations you have for students in the middle of the semester and doing so frequently results in frustrated students. As such, it is important to clearly set expectations early in the semester and stick to them throughout the course.

When expectations are clear to the students and set at the appropriate level, students thrive. Setting expectations that challenge students, but also allows them to be successful, gives them the opportunity to optimize their learning without becoming frustrated. The higher the expectations in a course, the more one can get out of their students, but the risk is that students who don’t feel like they can reach the expectations become unmotivated to even try. When expectations are set a high level, we have to give students the appropriate guidance to reach those expectations.

**Students need to see a clear path for success.** It is the teacher’s responsibility to help outline a strategy that students can use to meet and even exceed the expectations set for them. Students need to be given a sequence of small achievable goals that can lead them down the road to a broader more significant achievement. Setting up a course this way allows students to climb large mountains without realizing it until they are at the top.

While it is important to set out a path for success, students need to play an active role in discovering and traveling this path. Students should always feel that they are active participants in their education. While we need to highlight the path early in the semester, the hope is that they will be able to see and create their own paths by the end. The skill of being able to create a path to achieving a broader goal is one that will be useful no matter what field of work or study the student engages in.

**Students need to be able to see the usefulness of the skills they are developing.** As math teachers, we need to recognize that many of the students enrolled in our courses are not going to be math majors. In fact, many of them will end up working in fields where the content learned in class is of little to no use. The students need to be shown that this does not make mathematics a useless subject for them. While there are obvious uses
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for math tied to content, what is harder for students to see is the value of mathematical reasoning beyond the ability to do computations.

No matter what field students end up working in, their employer is going to want them to have well honed critical thinking skills. While most roles within the average business do not require the ability to compute derivatives of functions by hand, the abstract skills developed while learning how to differentiate will always be useful. If nothing else, mathematics classes give students the opportunity to practice assessing situations, distilling out the important information, and applying known facts and formulas to draw a reasoned conclusion. While the conclusion usually what is actionable, the process used to draw that conclusion is what justifies that action.

Mathematics classes need to emphasize the process of getting an answer as much as the answer itself. Too often math courses place the bulk of their emphasis on getting the correct numerical answer, usually by following an algorithm closely from start to finish. This tends to be one of the unintended consequences of online homework assignments. While getting correct answers is an important part of math class, students need to understand that there is another goal to math classes, namely, learning to clearly communicate the work that supports their answers. Students need to be taught to understand and justify the work for each step taken towards their final answer. Mathematics is not something that is done in isolation. At any level, one goal of mathematics courses should always be clear justification for answers provided as well as understanding why the process used to get the right answer works. Students don’t always see mathematics classes as an opportunity to learn writing and communication skills, particularly in classes that are not proof based, but emphasizing these aspects of mathematics allows student to leave the class with skills that will affect their performance across all of the rest of their academic and professional careers.

In conclusion, as mathematics teachers it is our responsibility create an environment for student success. Every student who steps into a math class should be given the opportunity to reach their full potential. This means that we, need to take extra care to set a good example for our students. They should be able to understand the level of quality that we expect from them by looking at the quality of work that we present to them in class.

1.1. Undergraduate Research and Thesis Writing Philosophy. Undergraduate research and thesis writing should have, at its heart, four main goals:

- Students should be exposed to new topics that they were not exposed to in their traditional undergraduate classes.
- Students should gain experience using research tools like arXiv and MathSciNet.
- Students should become comfortable presenting mathematics to their peers and professors.
- Students should see what it entails to write and publish an article with a new result.

All of these are important goals to have when designing a research project for undergraduates and each presents its own challenges.

Of these four goals, the last one is usually the hardest to achieve and any project that succeeds in the first three should be considered a success. If students can learn the basic mechanics that go into doing and communicating research as well as gaining some exposure to more modern mathematics, then their thesis or research project should be considered a success.

Conducting research with undergraduates is a learning experience for the advisor as well as the undergraduates involved. Every student is different and each of them needs to have expectations set for them individually. Knowing a student’s abilities and getting the most out of them is one of the main challenges of advising students in any context.
2. Teaching Experience

Lectured: The Art of Problem Solving; Introduction to College Algebra; Calculus I, Ib, and II; Multivariable Calculus; Applied Linear Algebra; Linear Algebra; The Theory of Numbers; Groups, Rings, and Fields; Introduction to Real Analysis; Special Topics: Number Fields.

Discussion Sections: Calculus I and II

The Louis J. DeLuca Memorial Outstanding Teaching Assistant Award, 2010.

3. Teaching Evaluations

At the end of every semester, Amherst College asks students to anonymously fill out a survey about their experience with the professor over the past semester. Some of the questions they were asked to answer include the following:

- Was the material presented in a well organized and clear manner? Did you feel that each lecture covered useful material, and that lectures were a critical element of the class?
- Did you feel encouraged to make comments and ask questions? Did you feel that your questions were understood and clearly answered?
- Was Professor Daniels sufficiently available outside of the lectures? If you utilized office hours, did you find them helpful?

Below are some of the answers I received from the students in my Fall 2013 Introduction to the Calculus course:

- “Expectations were made clear, feedback was always welcome, and the material was always kept fresh and manageable.”
- “Professor Daniels was an incredibly engaging professor, he has excellent command of the class and made it both entertaining and valuable.”

Below are some of the comments that I received from the students in my Spring 2014 Groups, Rings, and Fields course:

- “I never feel intimidated to ask questions in Professor Daniels’ class. They are always well understood and answered and he is careful never to move on until I make it clear that I understand the answer.”
- “Professor Daniels constantly encourages questions and comments from his students, which he always is prepared to answer. He’s a very friendly guy and makes sure that anyone that asks a question doesn’t feel like it’s a “stupid” or “useless” question, which is particularly important at higher levels of mathematics when concepts or proofs can often get confusing”

Below are some of the comments that I received from the students in my Spring 2015 Introduction to Analysis course:

- “Professor Daniels is an amazing professor, I wish I could take more classes with him. He truly cares about his students and does everything in his power to help us learn and understand the material.”
- “After I didn’t do as well as I would hope on the first exam, he sat down and met with me. Instead of feeling discouraged, I came away from our conversation feeling VERY encouraged by his guidance and support, and he really motivated me to work hard the rest of the course. He really cares about his students.”

Similarly, at the University of Connecticut, every semester ended with the students anonymously filling out a survey about their experiences in class. The survey consisted of two sections. The first being a survey that

\[ More about my teaching evaluations from the University of Connecticut and Amherst College, including all comments and statistics from previously taught courses, are available upon request. \]
consisted of questions asking the students to rank their instructor on a scale of 1 to 10 in various categories and the second section consisted of short answer questions. For brevity, I will omit the short answers here and only provide the statistics gathered from the first section of the survey in classes that I lectured.

The first eleven categories that we were ranked on a scale of 1 to 10 were: presented material clearly, organization, clear objectives, clear assignments, stimulated interest, graded fairly, appropriate exams, accessibility, interest and concern for students, and preparation. The information from this part of the survey is given to us in a single sheet with all of the statistics listed.

Here is some of the data from the classes that I lectured at University of Connecticut:

<table>
<thead>
<tr>
<th>Question</th>
<th>Fall 2007</th>
<th>Spring 2008</th>
<th>Fall 2008</th>
<th>Spring 2009</th>
<th>Spring 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presented Material Clearly</td>
<td>8.4 &amp; 9.5</td>
<td>8.2</td>
<td>8.7</td>
<td>9.5</td>
<td>8.8 &amp; 9.2</td>
</tr>
<tr>
<td>Stimulated Interest</td>
<td>7.9 &amp; 8.5</td>
<td>8.8</td>
<td>9.1</td>
<td>8.8</td>
<td>8.5 &amp; 8.8</td>
</tr>
<tr>
<td>Accessibility</td>
<td>9.1 &amp; 9.9</td>
<td>9.7</td>
<td>9.5</td>
<td>9.4</td>
<td>9.6 &amp; 9.7</td>
</tr>
<tr>
<td>Interest and Concern</td>
<td>8.7 &amp; 9.9</td>
<td>9.6</td>
<td>9.5</td>
<td>9.8</td>
<td>9.4 &amp; 9.4</td>
</tr>
<tr>
<td>Preparation</td>
<td>8.5 &amp; 9.6</td>
<td>8.8</td>
<td>8.8</td>
<td>9.5</td>
<td>9.5 &amp; 9.6</td>
</tr>
</tbody>
</table>

To summarize the data, we are given our mean score on the first 11 items of the survey as well as the university and department means. Here are my average scores from the past few years:

<table>
<thead>
<tr>
<th>Class</th>
<th>Personal Average</th>
<th>Department Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2007</td>
<td>9.5 &amp; 8.7</td>
<td>8.4</td>
</tr>
<tr>
<td>Spring 2008</td>
<td>8.9</td>
<td>8.6</td>
</tr>
<tr>
<td>Fall 2008</td>
<td>9.1</td>
<td>8.5</td>
</tr>
<tr>
<td>Spring 2009</td>
<td>9.5</td>
<td>8.5</td>
</tr>
<tr>
<td>Fall 2009</td>
<td>9.0 &amp; 9.1 &amp; 9.3</td>
<td>9.0</td>
</tr>
<tr>
<td>Spring 2010</td>
<td>9.0 &amp; 9.7 &amp; 9.9</td>
<td>9.0</td>
</tr>
<tr>
<td>Fall 2010 1132</td>
<td>9.5 &amp; 9.5</td>
<td>8.6</td>
</tr>
<tr>
<td>Spring 2011</td>
<td>9.2 &amp; 9.3</td>
<td>8.5</td>
</tr>
<tr>
<td>Fall 2011</td>
<td>9.4 &amp; 9.4 &amp; 9.5</td>
<td>8.9</td>
</tr>
<tr>
<td>Spring 2012</td>
<td>9.2 &amp; 9.3</td>
<td>8.9</td>
</tr>
</tbody>
</table>

One of the most common pieces of constructive criticism that I received from my students at Amherst College is that I would frequently start class by reviewing what was covered in the previous lecture. I remind students of the basic definitions and general context that we were working on. Students found it to be “occasionally helpful and probably necessary, but at other times felt repetitive.” I need to work on finding a balance between reminding students what we covered in the previous class, and being repetitive. As a lecturer, it is important to not lose your audiences attention at any point in the class, particularly at the beginning.

Another common piece of criticism that I received was about my email response to questions. Some students found my email responses, “not particularly enlightening.” One of the things that I am working on is finding a way to email students about questions without simply giving them the answer. I have always found this easier in person because the Socratic method does not translate well into emails. Students generally don’t find emails filled with more questions “particularly enlightening.” I have been trying to combat this problem by responding with similar examples that highlight the issue of confusion, without giving the student a complete (or nearly complete) answer to the homework question they are working on. So far it seems to be working.

In the end, no teacher is perfect and we all need to take the time to listen to and read our students comments. Student evaluations are not only a way for professors to hear about the things that they are doing right, but also a way for the students to provide constructive criticism to professors. Only by listening to the constructive criticism provided by the students can we grow and develop as teachers.