Humans are not born knowing everything they need to in order to survive. We cannot simply look at a phenomenon and intuitively grasp its nature, origin, purpose, or reason for existence. We cannot pick up an object and immediately know its form, function, and history. What we need to know in order to survive we must learn. As we grow and develop our families, our neighbors, and our communities teach us how the world works. They tell us the names of things and demonstrate their uses. They explain the history of a thing and why it is important. They tell us stories and fables meant to entertain, and eventually to guide or decision-making. An essential part of the human experience is to learn from others and the world. By extension the role of the teacher is almost as important that of the learner; I take this role very seriously.

As an undergraduate tutor with the mathematics department I realized I had a knack for explaining challenging material in a way people could understand. As a graduate student I discovered how different it is to teach a classroom full of people instead of a table full, but the fundamental principles were the same. I learned. I adapted. Learning does not, in and of itself, require a teacher. When a child touches a hot stove it is not necessary for an adult to be present to gloat for the lesson “HOT” to be learned. What an adult can do, however, is add to this lesson. To explain “why” and “how” and to help the child make connections and begin to grasp other aspects of their environment. A teacher is not someone who stands apart and simply recites facts at the student; a teacher is a knowledgeable person who helps others understand the “why” and “how” of things. A teacher helps others make connections and helps them understand the environment of the studied subject. A “good” teacher is someone who can explain a concept in a multitude of ways and with the patience necessary to find the explanation that works best for his or her audience. Such a teacher must have a strong grasp of their subject matter and they must care about their students as people. The lecturer who stands before a classroom and recites what he or she knows is no more useful than a book; often less so. Teaching is a dynamic process that requires a commitment from those who would teach and those who would learn to work together towards a common goal.

As a professor of mathematics I am tasked with teaching one of the most rigorous and challenging disciplines a person can study. Unlike most disciplines, mathematics courses require continuity of knowledge, with every class building on the one that comes before it. Thus it is even more important that I job my job correctly and well; anything my students fail to learn in my class will affect them detrimentally in their next class. This also means that I must be prepared to engage students that are not as prepared for my classes as their transcript might otherwise suggest. Teaching at a community college, I am called upon to teach a wide variety of classes ranging from basic algebra to vector calculus. It takes a very different attitude to teach a student who has had numerous bad experiences with math and just wants to get on with their life than it does to teach a student who is passionate about learning and hangs eagerly on your every word. In my experience, many students who take the non-credit mathematics courses are predisposed to dislike math, some because they had “horrible” teachers before, some because they always found it too hard, and some because they haven’t taken a math class in over a decade.

When teaching mathematics it is important to focus on two main things: concepts and techniques. The concepts are the motivating ideas at play. What does derivative mean? What exactly is a function? What do we mean when we say there are different sizes of infinity? I would say content is the more important of the two, and it is the one most easily communicated with non-mathematicians. Techniques, on the other hand, are "how" questions. How do you take a derivative? How do you show a relation is a function and that determine if that function is injective? How do you determine if two infinite sets are the same size? Techniques are formal applications of the axioms, definitions, and theorems. They are learned by observation and frequently repetition. Whenever possible I attempt to motivate the material by first discussing the concepts involved. Once students have in their mind what should be going on, then I focus on the techniques required to work a problem. I explain the concept in several ways, then ask the class if they understand. If anyone indicates, but raised hand, vocal response, or even a look of confusion, then I explain the concept again and again until everyone acknowledges that they understand. It is vital that students understand the concept before moving on to the symbolic manipulations, because otherwise the techniques will have little meaning. When I move on to demonstrating the techniques I do so with a plethora of examples. Generally there will be an example of each type of questions worked out in the text, but I feel it is important to provide students with as many examples as possible. When I work these examples I take the opportunity to draw my students into the problems by asking them to help me work them. This is where I reinforce their understanding of the concepts as well as techniques from that or a previous class.

If someone were to look through my teaching evaluations from my time at NOVA he or she would see that my students appreciate this approach. A calculus student from the fall of 2010 wrote in response to the question "What did the instructor do especially well in teaching this course?" that "He provided very detailed explanations and gave good examples. He was able to show us the big picture, but in a way we understood. He is an exceptionally good teacher." A vector calculus student from the fall of 2009 wrote "If someone didn't understand something he stayed on the topic and used examples until it was understood." An algebra student from the fall of 2008 wrote "He made sure to encourage every student to express their difficulties so that he could help as much as possible. You can tell that he wanted us to succeed!" These are only three of the hundreds of evaluations I have in my office, many of which make a point of saying that they like the number and type of examples I use. By presenting numerous different examples to my students, I help my students succeed when they are working on problems at home when they do not have ready access to me.

It is important that students know they can succeed. Whenever someone asks a question in class, I treat the question and the student with respect. If the question pertains to the subject matter at hand, then I make a point of reiterating an explanation. If, on the other hand, the question is one to which the student should really already know the answer, then I answer it as an aside, jotting down a line or two of explanation and checking for comprehension before moving on. I tell my students over and over again that repetition breeds success, and that it is only by getting their hands dirty and working problems at home that they will master the techniques involved in the class. I also tell them what a poor student I was when I was in school. I let them know that while I was able to succeed without taking good notes or doing much homework, my grades were not as good as they could have been and I was at a disadvantage when I moved on to higher levels. Students of mathematics need to understand that there is often no one way to complete a problem, and that some problems may take hours to fully solve. Most of my students suffer from some degree of anxiety with respect to math, and I try to do what I can to help them over come this. I explain that for years I experienced an irrational fear when confronting certain types of problems. The trick, I tell them, is to just dive in; it's okay to make mistakes. When I solve a problem I don't always solve it correctly the first time, but I just keep throwing techniques at it until something works. When teaching a course like abstract algebra or discrete mathematics where the emphasis is on proofs, I tell my students to "just write down true things". If they keep writing down true things that look like they might apply, eventually they will find something with which they can work. We fear what we don't know and what we don't understand, and this often extends to complicated mathematical statements. If my students can learn to take a deep breath and just begin, then they will have overcome one of the largest obstacles in the way of their learning.

In order to learn mathematics you have to "get your hands dirty". You need to be willing to sit and work problem after problem for hours on end until you understand what's going on. Examples from the book and from class notes are useful templates to help a student get started and as a reference when the student invariably gets stuck. Homework is thus a necessity of any and all mathematics courses. If you don't practice with the material, you never really internalize it. Native intelligence and good listening skills are no substitute for hours spent grappling with problems at the edge of your understanding. The question is, how much homework is enough homework? Conversely, how much homework is too much? These are fairly personal questions, the answers to which will vary from student to student. For my part I handle homework in the following way: I provide my students with a list of recommended assignments, but I do not require homework for a grade. I emphasize repeatedly throughout the course how doing a sufficiency of homework is essential to their understanding and mastery of the content. I arrive at class early every day to take homework questions, and I will happily spend the first fifteen or so minutes of any class working homework problems as well. Many of my students tell me that they do all of the problems I assign. Others tell me they work all the odds, the answer to which are frequently in the back of the book. Still others work every single problem in the book. This model works very well in my calculus classes and above, and even in my liberal arts math classes, but has not been as successful in recent years in either my algebra or pre-calculus courses. I have adapted my homework paradigm by using companion homework software linked to the course texts. Students in my algebra and pre-calculus classes are required to work a few algorithmically generated homework sets online which are incorporated into the students' grades. Despite this use of technology, however, I still encourage students to work problems by hand, if for no other reason than that the exams are all offline. I do not like having to use such an extrinsic rewards approach to getting my students to do their work, but in this particular course sequence it seems to be necessary.

Assessment in my courses is through written examinations. For the more foundational courses like algebra and pre-calculus I give five or six chapter exams and a final exam, while at the level of calculus and above I give two or three exams and a final. Generally the more exams

I can give the better, because it allows students to focus on a smaller set of material when they are studying. It also helps to correct errors in thinking before we move on to subsequent material. In the higher level courses the students usually display better study habits and are better able to study across chapters. I have a unilateral policy not to accept late work or give make-up exams for any reason. However, I always replace the lowest exam with the final exam score, but only if it helps. The reasoning is two-fold: first, since the final exam is cumulative, a student must learn the material by the end of the course regardless, and second, no one bad exam should be able to destroy a student's grade. I make it a point to grade exams as quickly as possible, ideally returning them during the next session. On rare occasions it has taken my a week to return an exam, but I never let more time pass. When I return their exams I write detailed solutions on the board, explaining each and every step and answering all questions. I tell my students that I sometimes reuse exam questions on the final, which I sometimes do, to further encourage them to make note of my solutions. I explain how one bad grade is not the end of the world and that grades can always be redeemed. I tell them that if they don't like their grade there are steps they can take to improve, including doing more homework, asking questions in class, going to the Math Learning Center on campus, or coming to my office hours.

I love it when students come to my office hours. This makes me something of a rarity, but it tells me that my students care; that they want to learn. I try to hold office hours at times convenient for my classes. Sometimes a student can't make any of my posted office hours, so I make a point of coming into campus at a time that they can make it. I will answer any questions they have and I will clarify any subject matter they need me to, but I do ask that they come with specific questions in mind. As a student I always enjoyed the time I spent chatting with my professors, so I try to be as approachable as I can. My students' success and understanding is my primary goal and the supplemental instruction of office hours are a powerful tool to help me achieve this. In class I plead with my students to let me know if there is something they don't understand. I tell them how much it pleases me when students come to my office hours and I share with them anecdotal statistics about the success rates of those who attended frequently in the past. I want my students to fell that I am there to help them; a resource to be used. I try to cultivate an air of approachability.

Another aspect of my teaching that I consider of key importance is my attitude; with respect to my students, my subject, and myself. I always treat my students with respect. Some students like to engage in friendly banter and I am happy to oblige them. Good natured teasing, when instigated carefully can help a class bond and increases the enjoyment of everyone present. I am a large man and I am aware that some students may initially be intimidated by me, so I make a point of dressing and speaking casually. I freely acknowledge my mistakes at the board, correcting them self-deprecatingly and moving on. This signals to students that it is okay to make mistakes, and that there is an expectation that a minor error or two will not spell doom for them on an exam. A vector calculus student wrote on one of my evaluations that I "utilized classroom features to accurately describe the 3-D coordinate layout formed by the x,y,z axes". This was in response to a comical moment of frustration on my part. I was teaching my students about the right-hand orientation of three axes in space and had, for the fourth or fifth time, transposed the x- and y-axes. In my frustration, and with a fair amount of glee, I labeled the walls beside the white board “x” and “y”. In black marker. My students were both shocked and amused by this, but with that single moment defiance I had won them over. These labels remained a useful and entertaining feature for the rest of the semester whenever I would double check the labels to make sure I was speaking or labelling my diagrams correctly. More than a year later these labels remain, and I look forward to using them again every time I teach the class in the future. I do not consider myself better than my students. The way I see it we are all there for the same reason: to do math. I’ve had years of practice with different kinds of math, so I have many insights, tips, and tricks to share with them. My casual attitude and manner is essential for breaking down the stilted roles of master and apprentice, and allowing us to move forward as people working toward a common goal.

I love teaching. It is my vocation and my craft, and based on student evaluations I do it well. But I can be better. I can improve. Learning is a dynamic process that need never end. I am always on the lookout for teaching techniques that I can steal and incorporate into my own practice. I routinely ask my colleagues how they teach something or ask about the difficulties they face. I teach with passion, both for my subject and because I love helping my students succeed. I am not better than my students just because I have an advanced degree in a subject. I’m just a person who knows a little more about something; who’s been doing it long enough to pick up a few things that they don’t necessarily include textbooks. I have a responsibility to teach anyone who has the desire to learn, and it is a responsibility I take very seriously.