Though there may be some disagreement about the inherent value of abstract mathematics, there is indisputable value in the act of *learning* mathematics. Mathematical learning strengthens the ability to think analytically and reason abstractly, and thereby makes students better writers and problem solvers. As such, I try to emphasize to my students—from business calculus to partial differential equations—that mathematics is not solely the application of formulae for the purpose of mechanical computation. To me, teaching mathematics is about helping students realize their own potential to solve problems and think independently.

The foremost strategy in my courses is to make students internalize fundamental mathematical ideas before implementing them in computation and applications. I want students to understand what an integral *represents* before trying to compute it. Even at the most basic level, I strongly emphasize justifications so that a student never entirely divorces a theorem or formula from why it holds. Students are required to "explain" concepts or solutions with complete sentences. This helps to eliminate major gaps in understanding, and provides (when possible) a linear story. Ultimately, I have seen this conceptual approach lead to students viewing computation as part of a whole that is mathematical understanding, as well as increased overall retention. My (passing) calculus students complete the course with the ability to explain the equivalence of *instantaneous rate of change*, *slope of the tangent line*, and *the definition of the derivative*, as well as simply compute $f'(x)$ with a rule. Students themselves have been receptive to this approach, and "concepts" and "big picture" are mentioned frequently in my course evaluations. I have consistently received positive and high-ranking student evaluations from mathematics and physical science majors, as well as engineering students and non-STEM majors.[1] As a graduate instructor at the University of Virginia I received the annual TA teaching award in 2012[2]. In 2015, while at North Carolina State University, I received a "Thank a Teacher" award (from multiple students) via the Office of Faculty Development. Last year, in my first year as a faculty member at the College of Charleston, I received a First Year Experience award in recognition of faculty who made a difference in a student's first year at the College. In all, I believe I have been effective in various classroom environments; classes at UVA and CofC have been smaller, consisting of between 15–30 students. At Oregon State University and NCSU, my lectures were generally sized at 100 students (with smaller recitations).

I believe my classroom approach and course policies are conducive to accomplishing the goal of conceptual comprehension. I meticulously choose lecture examples that highlight major concepts, while simultaneously serving as good computational models for later student reference. And, I clue students in on *why* these examples have been chosen, reinforcing the greater context and helping to build a content storyline. I often motivate fundamental mathematical concepts with content beyond the text. This typically manifests itself in small research or reading projects for students. Past examples of these "enrichment assignments" in undergraduate classes have included: the Newton/Leibniz feud, non-Newtonian calculuses, Gronwall's inequality, the brachistochrone problem, cardinalities of infinite sets, and the 1-D wave equation. I attempt to provide a context for the content I present, and paint a broader picture by embedding course material in outside topics. I always try to highlight where course concepts are relevant in the physical sciences or higher mathematics. When appropriate, I try to devote one lecture in a course to a physical or engineering application, wherein a real-world concept or investigation (e.g., the dynamics of a bridge) is related to a recent course concept (simple harmonic motion). This affords me an opportunity to connect class material to aspects of my research. As an example, in my ordinary differential equations courses, I typically group students together and ask them to solve the spring-mass initial value problem with damping and forcing. I then ask them to describe the solution qualitatively; in the final step, I utilize a projector (and applet) to generate a real time movie depicting the spring-mass system they have just solved. Following this, I can connect their analysis to 1-D models for bridge and wing flutter, and illustrate the effects of mass, stiffness, and dissipation in a more complex PDE model.

Because procedural fluency and computational proficiency are important in mathematics, I also assign carefully chosen computational homework sets, wherein students can work straightforward problems to master mechanics and check solutions for correctness; however, these sorts of problems are never the primary focus of my materials. I try not to overwhelm the students with computational homework, making room for alternative assignments and assigned reading.

Often, I mention to my students (perhaps too frequently) how important analysis and exposition are in

[1]Selected student evaluations, statistics, and comments are available on my homepage: `http://websterj.people.cofc.edu/JustinsHomepageResources.html`

[2]This award is given for overall excellence in teaching, based upon evaluations, submitted materials, and an in-class observation, and was voted on by the entire mathematics faculty.

STEM fields. I firmly believe that students should be expected to analyze what they have calculated (or proven) and explain their thinking. This will be expected of them outside of the classroom, and is beneficial in the greater academic and professional context. In every course I teach, justifying, interpreting, and explaining represent a substantial portion of the workload. I expect students to present their work neatly, explaining their steps clearly (in complete sentences), and to address whether or not they think their answer is reasonable. In this way, though an answer may be incorrect, I know serious thought has been allotted to the problem. I also periodically ask volunteers to present solutions on the board, and facilitate a class-wide assessment of the exposition and correctness of the solutions (and make necessary changes).

In the past few years I have developed a practice which I am now quite fond of: I provide supplements to the textbook at regular intervals during the term, which may include: a linear overview of content, with examples worked in detail and presented as I expect students to present their computations and proofs, or reflections/connections from lecture that were not necessarily written out. Sometimes, for complex calculations or involved descriptions, I instruct the students to stop taking notes and focus on the calculation/argument, reassuring them that I will provide detailed notes in a later supplement. Students appreciate these packets and make good use of them. I have also seen an increased depth in student understanding, and (especially) a subsequent improvement in the quality of their submitted materials.

I am a believe strongly in office hours, and make ample use of this time to review lecture material, graded content, and to have students work problems in front of me. My office hours are almost never empty, and I do not shy away from encouraging students to come—especially if they are struggling. I have seen many students have breakthrough moments in my office hours that turned their course experience around.

One area in which I am always "fine-tuning" is assessment. Every instructor knows that incorporating meaningful feedback into a course can be challenging, especially if one does not have grading assistance. I must be careful to give myself adequate time to conduct my research activities. To date, I have made use of weekly quizzes, research assignments, and written and online homework, each for a very specific reason. However, I am still searching for the best means of providing feedback to students and accurately making prompt, informative assessment. Certain tactics do have more success than others; for instance, I find that calculus students often neglect to read comments on graded homework. However, they carefully pore over graded quizzes, owing to their brevity and higher point value. Hence, I make more detailed and specific commentary on these quizzes and provide remarks on general course standing. I have also found that downplaying the role of mid-term exams (and replacing them with smaller, more varied weekly quizzes) is effective in keeping students consistently engaged, and more forgiving (eschewing the irrecoverable "bombed" exam). Continuing on, I hope to find efficient means of assessment that benefit students, while not requiring overwhelming grading time.

I should also assert that I believe teachers of all sorts must be open to *assessment of their policies*, as well as their methodology in the classroom. I want to be malleable, as the students and technological setting change. I take and respond to feedback during the term, asking students to anonymously report on mechanics of the course, whether or not they are connecting with and retaining material, and also to make suggestions about what types of review material they would like to see.

I am very excited about this prospect of teaching senior or graduate level courses. To date, I have substituted in various graduate and upper-division undergraduate courses. I have also supervised two undergraduate students as they performed summer research in analysis and numerical simulation of applied PDE models. In this field there are many opportunities to incorporate undergraduates into the modeling and numerical facets of a problem, and our work to date has yielded meaningful results in mathematical aeroelasticity. These experiences will inform how I will structure upper division and research-level courses, with my guiding maxim being: *deep thinking about challenging problems is where true mathematical learning takes place.*

In conclusion, I would like to assert that I *enjoy* teaching mathematics, and ultimately, this helps me succeed in imparting knowledge. Students consistently comment on the energy and enthusiasm I bring to my teaching. I do not believe enthusiasm or energy should be faked, but teachers can make a concerted effort to be mentally present, awake, and to show the affection that they have for their material. I think I have a unique teaching style and effective approach which encourage and provide for the success of my students. From my evaluations, my courses are memorable, and students leave with conceptual retention, computational skills, and having been exposed to an array of applications. And lastly, since I attempt to challenge each one of my students at a conceptual *and* a computational level, each leaves my course an improved problem solver. I hope to continue improving my ability to communicate mathematics effectively and actively create an environment where intellectual growth can take place.