Meteorology Major and Computer Programming Minor

First and Last Name	*Jaye Norman*
NCSU Student ID#	*200504204*
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My goal in my education and profession is to strengthen the intimate relationship between physical science and engineering. Nowhere is this relationship stronger than in the atmospheric sciences. My academic path, with a major in meteorology and a minor in computer programming, is designed to combine these two disciplines and generate strong, well-founded solutions, allowing the natural phenomena of the world and humans to coexist.

I entered college at North Carolina State University as an aerospace engineering major, with the intent to add the double major of meteorology after my first year. Satellites used for weather observations fascinate me, and I thought that a double major in these fields would set me up to develop and use them.

Well, I realized after attending club interest meetings and speaking with upperclassmen that my true passion was not designing and building satellites and spacecraft. While I was intrigued by the processes of aerospace development, it was not a passion that I possessed. Less than two weeks into my first semester, I concluded that the plan I had so carefully crafted was not going to get me where I wanted to be. I was horrified; I worried about my future and how I was going to become the meteorologist that I wanted to be.

The freshman Marine, Earth, and Atmospheric Science advisor was incredibly helpful in discussing my goals and how best to achieve them at NC State. She was able to calm my nerves about not knowing the path I wanted to walk and helped me build a new one. I brought up a computer programming minor primarily as a throwaway comment, but she mentioned the value of coding for data analysis and modeling in the field of meteorology. I realized I did not want to physically build things as an engineer but use the problem-solving mindset to further my weather expertise. As such, I switched to a meteorology major and a computer programming minor, allowing me to focus on my passion for meteorology while also gaining software engineering

skills. By my second semester of college, I was loving my time in meteorology courses and computer science electives.

In completing my bachelor's degree, I have built a foundational knowledge of atmospheric physical science while also learning how much we still do not know about this vital part of our Earth. For example, in atmospheric physics, I learned the mechanisms of cloud formation, and in atmospheric dynamics I and II, I learned the large-scale motions that result from pressure differentials. These courses focus on the across-scale physics that drive the motions of the atmosphere while also emphasizing scientific communication and ethics. I have built a strong foundational knowledge and skillset in these courses.

Right after my atmospheric science courses, I would hop onto the bus and make my way to Centennial campus for my computer programming classes. These courses supplied me with software development skills, knowledge in Java, Python, and C programming, and collaborative tools like git. Additionally, the computer science department has a strong emphasis on collaborative programming, where I learned vital leadership and teamworking skills. I was coming from a different background from most of the computer science majors, who spent their whole day coding, and learned to contribute this unique application perspective to create a robust program. While making a Yahtzee program in Java might not have much use in a meteorology class, these projects and courses have equipped me to adapt to the demands of meteorology software development.

During this process, I learned about the struggles of interdisciplinary work. Going from Jordan Hall to Engineering Building II (the homes of the Marine, Earth, and Atmospheric Science and Computer Science departments, respectively) is like stepping into two unique worlds. The screens suddenly go from hurricane forecasts and graphs of climate variables to

code traces and terminal output; I go from talking about phenomena, measurements, and data analysis to talking about development, computing environments, and machine calculations. The two disciplines are looking at the same situation through different lenses without seeing each other's perspectives. My meteorology friends would always joke about how much they hated coding, and most of the computer scientists that I worked with would make the "getting paid to be wrong" joke that you get often as a meteorologist.

This disconnect is in part because there is scarce communication between the departments. Imagine for a moment if we improved cross-department collaboration: engineers and atmospheric scientists building the best instruments and models to facilitate revolutionary scientific discoveries. Fortunately, that is what other engineers, scientists, and I are aiming to do. To do so, however, I must be a competent communicator in both science and technology. When giving a talk about my cross-disciplinary work, I began to give it a bit differently if I was talking to a meteorologist or an engineer. I didn't have to explain continuous development pipelines to engineers, but I put a little extra emphasis on this definition when talking to meteorologists. By contrast, all the meteorologists I presented to were familiar with CAPE, but I spent more time explaining this portion to computer scientists. My interdisciplinary academic path has taught me the importance of catering to your audience while communicating across fields.

My academic path has not been what I expected when moving in during freshman year, but I don't think I would have it any other way. I have a curiosity for weather and an itch to solve puzzles and create, and this discipline-diverse program of study has ensured that I can marry those two things in my career path moving forward. As a result of my courses, I have decided that I want to work in the numerical modeling of atmospheric dynamics in my graduate studies and my career. This takes the applied physics and dynamics that I gathered from my meteorology

background and combines them with the concepts of efficiency and parallelism in programming that I've learned from my programming background.

As I move forward into future graduate studies and a career as a researcher, I am honored for this opportunity to explore both fields I love as an undergraduate student. I am grateful to the advisors, professors, and peers who have provided support for this endeavor across departments. This path has set me up for success with interdisciplinary communication skills, academic success, and an exploration of what it means to be a scientist and an engineer.