

Featured Alumnus Brandon Marsell ('07)

An open letter to Stetson physics majors

I started at Stetson in 2003, graduating with the class of 2007. I always did very well in math and science and I knew that this would define my career path. I was fairly certain I wanted to be an engineer, but with so many different engineering specialties it was difficult to know which I would choose.

One thing I knew was that physics would be my major. I figured that I could specialize later. It turns out this was an excellent decision. Being a physicist before I became an engineer gave me a much better perspective when it came to problem solving in the real world. Having a physics background allows me to take a step back and analyze the problem from a broader physics-based perspective before diving into the engineering solution. I believe that my physics background gives me a better feel for how things work and what will make sense, which I have learned is something that is often lacking in engineering students.

Today I live in Cocoa, Florida. My commute to work is a whopping 20 minutes, and most of the drive is along the intracoastal waterway where I can truly appreciate the beauty of Florida's nature and often catch a glimpse of alligators, manatees and dolphins. It's a beautiful drive.

My career is a huge part of my life, but I also enjoy spending the weekends with my girlfriend Sophia whom I met while at Stetson,



Sophia and me in Costa Rica

watching Formula 1 races and harvesting my ghost pepper plants. Last year, I finally was able to attend the F1 race at Austin, Texas. This was an incredible experience and I highly recommend it for any racing fan. Finally, at least once

a year I travel to Costa Rica to visit my parents, who live on a farm in the mountains. There really is no better way to unwind than in paradise.

But back to my specialty. I now work in the fluids analysis group for the Launch Services Program at NASA. When NASA buys a rocket from a contractor, like the United Launch Alliance, Orbital Sciences Corporation, or SpaceX, they produce a large amount of documentation to prove the rocket will perform as expected. It is my job to review any documents related to fluid dynamics and assess their accuracy. In doing this, I conduct a large amount of independent analysis. It is our job to ensure the rocket is properly configured and capable of delivering the payload to where it needs to go. We work on everything from Mars rovers to weather satellites.

Brandon Marsell's Overview

Professional Experience

Company Owner
Freedom Engineering, LLC
Cocoa, FL
July 2013-present

Aerospace Engineer
NASA
Kennedy Space Center
March 2013-present

Aerospace Engineer
a.i. solutions
Kennedy Space Center
June 2012-March 2013

Aerospace Engineer
QinetiQ North America
Kennedy Space Center
May 2009-March 2012

Education

Embry-Riddle Aeronautical University
Daytona Beach, FL
MS – Aerospace, Aeronautical and
Astronautical Engineering
2007-2009

Stetson University
DeLand, FL
BS – Physics
2003-2007

Projects and Missions

SPHERES-Slosh (ISS)

Mars Science Laboratory Curiosity Rover

Van Allen Probes

JUNO Jupiter Probe

Magnetospheric Multiscale Mission

Landsat 8

Solar Dynamics Observatory

I have an incredibly powerful computer to work on, access to all of NASA's supercomputers, a white board for very important equations, and of course a mug for a much-needed caffeine boost in the afternoon. The rest of my team is in the surrounding desks, and the building is full of incredibly smart people. I spend most of my work days in this setting, but occasionally I'm given the honor to attend conferences, national meetings and other exciting opportunities to network, learn and grow in my profession.



Without hesitation I can say that it is because of my degree in physics from Stetson University that I am now a NASA aerospace engineer. Everything from my initial decision to major in physics to starting the astronomy club to my internship in Colorado has paved the way for me to become who I am today. I feel extremely proud to be a Hatter.

My days at Stetson were some of the best days of my life. People say this all the time about college and having experienced the four years of academia, life-long friendships and once-in-a-lifetime experiences, I know why. College is always depicted in movies as being one big party, and although I did have a lot of fun, I knew how important it was to be disciplined and work hard. I always fully understood how lucky I was to get to go to such a great school.

While at Stetson, I joined the fraternity Delta Sigma Phi where I made many great friends with which I still keep in touch. It's awesome having these friends, especially during the NFL season when I get to destroy them at fantasy football, but that is another story.

One unique experience I had during my time at Stetson was founding the Stetson Astronomy Club. This is just one example of why it is so nice to go to a small school. I could not believe that I had access to an extremely expensive telescope that I could literally use whenever I wanted. I had access to it 24/7. At a large university, students have to sign up and wait days before getting access to such a unique piece of equipment—Stetson is awesome!

Another invaluable experience that I highly recommend for all students is to do as many internships as you can. Besides being a great chance to get real world experience, it is one of the best ways to network with people in your field, people that may eventually hire you.

In my third year at Stetson, I interned at the High Altitude Observatory (HAO) in Boulder, Colorado. This is part of the National Center for Atmospheric Research (NCAR). I ended up working with a scientist that was deeply involved with the design of a next generation solar observing satellite. I don't remember what satellite it was (I've worked with so many it's hard to keep track!) but I do remember thinking that it was incredible to be working on something that was supposed to go into space. And, that's when it hit me. It was in that moment that I decided I wanted to be an aerospace engineer and work on space vehicles.

I got back to Stetson and immediately started applying to aerospace engineering programs and was accepted to Embry-Riddle Aeronautical University. In grad school I quickly gravitated toward fluid dynamics because it was interesting and useful. The Masters of Science degree I was seeking required a thesis. This is something I also recommend, even though it seems like a lot of extra work. I wanted to study something related to fluid dynamics, so I approached my fluid dynamics professor and asked about research opportunities. He invited me to join his current graduate student who was working on a project for NASA. I heard NASA and immediately decided I wanted in on the action. I applied for the Graduate Student Researchers Program (GSRP) through the Kennedy Space Center education office, was accepted and quickly took over the project. This



program is now called the NASA Pathways Program (<http://nasajobs.nasa.gov/studentopps/Pathways.htm>) and there is an undergraduate program, as well.

The project dealt with using computational fluid dynamics (CFD) methods to predict the effects of sloshing propellants in the tanks of satellites. We were trying to use computer models to estimate the force on the vehicle, a spacecraft or rocket, due to the movement of the liquids inside the tanks. Amazingly, these forces can be large enough to overwhelm the control system and can even cause a mission failure.

When I was nearing the end of the project I started looking for jobs. This is typically a stressful and long process. I was very fortunate and got three job offers, and they were all very interesting, but how could I turn down an opportunity to work at the Kennedy Space Center? It was because of my work during the GSRP that I was hired as an aerospace engineer for the Launch Services Program. The first three years I worked as a contractor for a company called QinetiQ North America and after that I was offered a civil service position as a full-time NASA employee.



The Launch Services Program (LSP) encourages innovation and out-of-the-box thinking. In addition to our normal day-to-day tasks we can choose to participate in special projects that allow us to do anything from gathering experimental data to developing new modeling techniques.

One of the most difficult tasks I've been assigned is predicting the movement of fluids inside the propellant tanks of upper-stage vehicles. I have developed several CFD models that I use to predict these movements, but the models are not accurate enough because they have never been validated against experimental data. I saw an opportunity to start a special project of my own to build, launch, and operate an experiment aboard the International Space Station (ISS) to solve this problem. After a year of design and fabrication activities we finally launched our experiment to the ISS in January 2014 and started operating a month later.



For this experiment we have a control room with live space station feeds and communication hardware that allow us to interact with the astronauts on the ISS in real time. Though these eight-hour sessions are a little stressful and usually occur in the middle of the night, the satisfaction upon completion is unmatched. After the sessions I am always amazed that I get paid to lead a project that is currently active on the ISS (in SPACE!!) and interact with astronauts. I love it.

I am extremely honored to be the Stetson Physics featured alum and am always proud to be a Stetson graduate. The time spent in my graduate studies doesn't compare with the time I spent at Stetson where I not only excelled in academics but learned more about who I was, what I wanted and what the world had to offer. Now when people ask me about my higher education, I say with pride that I attended Stetson University.

To all of the current and future Stetson Hatters: You are extremely lucky to be able to attend such a prestigious university. Do not take it for granted.

Work hard, set your goals high, do what you love, and never be afraid of a challenge.