The following speech was delivered by Kathryn Holloway CCAS ’80, chief of the neurosurgery section at the Hunter Holmes McGuire Veterans Administration Hospital and professor of neurosurgery at Virginia Commonwealth University Medical Center, to the Class of 2013 at the Rutgers–Camden Faculty of Arts and Sciences commencement ceremony on Thursday, May 23.

Chancellor Pritchett, Dean Lindenmeyer, honorable members of the Board of Trustees and Board of Governors, and class of 2013 thank you for the honor and pleasure of allowing me to circle back to my roots and speak with you today. 33 years ago I sat where you are. Ironically I was the person who chose our commencement speaker. I remember very clearly being intimidated by that task, just as I am intimidated by this task today. Things don’t change much do they? So, why me? The answer is that I share your roots, I started here. I achieved the success that I have had, standing on the same foundation that you have. And I want to tell you that you can do it too.

I am a neurosurgeon in a large University medical center. I have made a name for myself in the field of deep brain stimulation. This is a marvelous field that continues to fill me with wonder each day. You may have seen the surgery on TV: classically, the patient has uncontrollable movements. He submits to brain surgery that must be performed while he is awake. The surgeon drills a hole in the head, places the probe, and asked the patient to raise his arm, which shakes uncontrollably. With the flip of a switch the hand stands still, the patient gasps, and tears flow from his eyes. Everyone grins under their mask, including me, the surgeon. How many people get to do that every day?

Most of my colleagues remove pathology from the brain, resect a tumor or exclude an aneurysm from the circulation. My job is to alter the circuits. First we must understand the brain pathways involved, but then we can place a switch to reroute the flow away from the over active area to normalize it. I remember a movie that I saw long ago about a fictional woman who had acquired the ability to miraculously heal others with a touch of her hands. One of the people she saw was writhing in bed with uncontrollable movements, but had a clear mind. With the touch of her hands the movements stopped and the woman was transformed, able to rise from the bed that had held her prisoner for so long, and stride from the room. I remember so clearly thinking, I want to be able to do that! I now recognize that woman’s problem was dystonia muscularum deformans. During the intervening years we have identified the genetic mutation, DYT1, and the neural pathways affected by this disease. Through advances in technology, including ones that I have developed, I can now proudly say: I can do that! With me, it takes hours in the operating room with a highly skilled team and a lot of technology, rather than with the touch of my hands, but I can do that. That is a miracle.

We found that movement disorders are caused by problems in the automatic programs deep in the brain. We can rebalance these circuits with the implantation of a device called simply DBS. Our current limitation in applying this to all of neurologic disease is that we only understand some of the pathways in the brain. But our
knowledge is ever-increasing. We are identifying more circuits through advanced imaging that allows us to see the brain at work. We can now actually see a thought travel across the brain. For instance, we now understand depression as a neurologic disease. In depression, the normal yin and yang of emotions and cognition, happiness and sadness has gotten stuck in one position: in the sad and not thinking slot. In order for us to think clearly, our limbic emotional brain must be down regulated while our cognitive cortex is up regulated. That old expression that you can’t think when you are mad, in fact, has a physiologic basis. Depression is created by activation of the same circuits as normal sadness, but the ability of the brain to switch out of this into another state, has been lost. There is an area of the brain, the subgenual cingulate cortex, that becomes hyperactive in this state. Medication, psychotherapy or time can resolve depression, however in 30% of cases, none of these methods work, and the patient remains stuck in that miserable unhappy state. By placing a DBS in this location, we can turn this area off and return the patient to the normal give and take of the full spectrum of emotions and cognition.

We are also exploring targets for obesity, Alzheimer's, and schizophrenia. Some of our knowledge comes from serendipity just as it did in the days of old. Trials are underway to treat Alzheimer's with deep brain stimulation. The target for this surgery was discovered accidentally while trying to treat obesity. This patient had a doubling of his verbal memory capacity as a result of stimulating a nearby pathway in the memory circuit. These are fascinating tales of unintended consequences. The key is to be ready to take advantage of the unexpected.

In addition, we are using noninvasive tools to stimulate the brain with - yes, believe it or not - magnets. It may sound new age, but it is based on scientific principles and has already achieved results in treating depression. We are exploring its use in improving speech deficits. We are even beginning to have hope that we can help the brain rewire after stroke or brain injury by using some of these newer techniques.

An even more intriguing area is that of the brain machine interface. This is a rapidly developing field fraught with difficulty but equally pregnant with promise. Already, there are brain implants that allow the paralyzed to operate a robotic arm with their mind. And to think all of this is possible when just 33 years ago, as a student on this campus, my only means of communicating with a computer was to punch holes in index cards using Fortran code and feed the stack into a mainframe. Back then we had the equivalent of morse code, now I am talking about a direct link between the mind and machine! We have come so far so fast there is no telling where we will end up.

This level of discovery and innovation has not been limited to medicine. There are so many other examples of exciting things happening in this world that I do not have the time to elaborate on. Each of you graduating here today knows of those that are happening in your field. The pace is so great that you've probably seen significant
changes in just your time of moving from freshman to graduating senior. I sincerely hope that you share my excitement and that you see the limitless possibilities ahead.

But I am sure that you realize that there are also obstacles ahead, and you will have to rise to meet them. Many times you will find your way blocked. You will be asked to do what you think is impossible. You may be asked to give more of yourself than you think you have to give. I would ask of you that you don't sell yourself short. You will be amazed at what you can do. I can tell you that all of this has been true for me.

I grew up in a comfortable and secure environment in the suburbs of northern jersey, until I was a senior in high school. Then my family fell apart, splintered by the effects of alcoholism. My mother, brother and I fell below the poverty line in a small town in Arizona. My mother, who had a high school education and had spent her adult life as an upper middle class housewife, got a job as a dishwasher in a Mexican restaurant and washed floors in a donut shop. She did these things with enthusiasm and celebrated her newfound ability to stand on her own 2 feet. She absorbed knowledge like a sponge and acquired progressively better jobs through her ability to take the best out of everything before her and reveal it to those around her. She was then, and is to this day, my greatest hero and the person I most want to be like.

I came back to NJ and attended Rutgers University because of its long-standing history of academic excellence at an affordable price. I chose the Camden campus because of its nursing program. But soon after I arrived I found that a computer glitch was holding up my scholarship and financial aid. I had no money to live on for months and no one to turn to for help. I walked into a bank and asked for a loan. And so I began a journey towards self-sufficiency.

I found my niche on this campus. I made wonderful friends, met my husband, and got involved. The smaller size of the campus and the sense of community allowed me to come out my shell and do things that I would not have the courage to do elsewhere. Small things became bigger things, each step taking me further along the path. Along the way I had the good fortune to have good guidance from unexpected places. Some of the best advice came from my chemistry instructor, Ms Frietas. She told me that if I got into medical school that the money could be found to pay for it. With that single statement she turned my world around. I began to reach for something I had thought was beyond my grasp.

I found the first two years of medical school to be easy after the rigorous coursework here at Camden. I coasted a bit, but was pulled up short by the clinical training that followed. In the second two years of medical school and much more so during residency, I found that success was no longer determined by what you know, but by being able to get 10 things done at once and never, ever dropping the ball. This resulted in a sudden change from being one of the best, to just trying to keep my head above
water. This taught me that you can’t rest on your laurels; you always have to be ready for entirely new challenges.

My first year of neurosurgery residency consisted of working 42 hours straight followed by 6 hours off, before the start of the next 42-hour day. Day after day, I worked to acquire the ability to always put myself second, my fatigue, my hunger, my desire for sleep; all became secondary to the needs of those in my care. I learned from this that each of us has so much more capacity than we realize.

After six calendar years and enough work hours to equal three times that, I finished residency and became an attending neurosurgeon on the staff of the hospital that I trained at. Being an attending means that you have a team of residents who work for you but there is only one person on the team ultimately responsible for the outcome. This is when Harry Truman’s quote of “the buck stops here” comes to haunt your nights. Forevermore I will wonder whether I could I have done something better when things do not turn out well. This hardest lesson has taught me about despair and doubt and using them to make myself better for each subsequent patient.

These were some of the hard things in my past that have formed me. I have also told you about some of the wondrous things that are part of my present, and I will exhort you to embrace your future with a few parting words of advice:
Work towards self-sufficiency but reach for something beyond your grasp,
Be ready to take advantage of the unexpected, see the limitless possibilities ahead,
There will be times when doubt invades your thoughts. Know that you have hidden strengths that will only be tapped into during these dark times. Use them to make yourself better, smarter, stronger for the next challenge.
And finally, I dare you to follow my mother’s example and take the best out of everything and reveal it to those around you

Good luck and congratulations!