

Each spring, the Capstone Engineering Society honors one graduating engineer from The University of Alabama (UA) as the most outstanding undergraduate student in the College of Engineering based on “academic performance, professional and technical activities, college leadership, external leadership and other activities.” After being nominated by the professors in my department, I was selected as the Capstone Engineering Society’s Outstanding Senior for 2012. I view this recognition as the culmination of a broad array of academic and outreach activities throughout my undergraduate career. I have striven to excel in both intellectual efforts in the classroom and a spectrum of broader impacts to the community.

With a multitude of academically involved students in the college of engineering, I believe that leadership roles and outreach involvement have distinguished my efforts from other top students. Examples of my activities with students include working as a Teaching Assistant for an undergraduate lab course, and delivering multiple invited guest lectures. After two years of active participation with Material Advantage (MA) on campus, I was elected as an officer of the student-led society comprised of four professional materials societies. The following year, I served as President of the Alabama chapter of MA. My primary function as an officer in MA was to foster academic programming for UA students and events with broader impacts to the community at large. In my first year as an officer, I organized an event entitled *Science Café* in which students and professors collaborated to bring discussions and demonstrations of recent innovations to students and interested adults in the community. Held at a local bookstore, *Science Café* attracted large crowds of middle and high school students with whom we were able to discuss science and engineering developments with poster displays, models, and hands-on demonstrations. In total, *Science Café* offered UA students and faculty the opportunity to discuss our areas of research to more than 600 members of the local community.

After realizing the benefits of attending my first materials engineering conference during the spring of my junior year, I made it my primary goal as President of MA to offer funded opportunities to more undergraduates within the department for future conference attendance. Excluding myself, no undergraduate students from The University of Alabama were funded to attend the 2011 Annual Meeting of The Minerals, Metals and Materials Society (TMS). Through strategic budgeting and increased fundraising efforts, 5 undergraduate students from our chapter were able to attend the 2012 TMS Annual Meeting fully funded. This 400% increase in undergraduate funding for conference attendance included groups of students that are commonly underrepresented in engineering. In addition, our students delivered a combination of oral and poster research presentations while at the 2012 TMS conference.

In addition to Material Advantage, I served as Vice President in two interdisciplinary societies within the College of Engineering- Engineers Without Borders (EWB) and Tau Beta Pi (TBP). I became interested in EWB as a freshman when I learned of its mission of positively impacting local and international communities by providing hands-on support in the form of construction and clean-up service projects. As an officer in EWB, I organized and executed construction efforts with *Habitat for Humanity*¹ as well as debris cleanup efforts following a devastating tornado that passed through central and northern Alabama in April of 2011.²

¹ Coordinated Habitat for Humanity Build days in Tuscaloosa, Birmingham, and Brownsboro

² Coordinated Debris Cleanup projects in the Holt and Midtown neighborhoods

As a member of Tau Beta Pi, I enjoyed attending *Engineering Futures Seminars* covering the soft skills crucial to a successful career in engineering such as effective communication. As an officer, I attended the Tau Beta Pi Regional Conference,³ where I joined other TBP leadership across the southeast in more extensive team-leading and communication strategies. Such lessons served well in planning new initiatives for the student members of our chapter. After returning from the regional conference, I helped establish a tutoring program between the students in our chapter of TBP and those enrolled in AP Calculus courses at a local high school.⁴ With the lag in standardized scores in mathematics for rural high schools in Alabama compared to national averages, we found our student involvement in calculus tutoring to be highly beneficial.⁵

The Board of Trustees of ASM International recognized my efforts in educational outreach and my leadership potential by offering me a position as a student delegate on their Board for the 2012-2013 year. I have had the privilege of meeting with the ASM Board to represent students at both the collegiate level as well as those at the K-12 level. My work as an ASM student board member has aimed at increasing participation in materials outreach programs among students currently enrolled in materials engineering programs. If my efforts are successful throughout the coming year, ASM will be releasing new resources to assist in introducing K-12 students to the field of materials science, with a special focus on underrepresented demographics.

I have gained a strong interest in the study of failure analysis and material limitations after completing two internships in a failure analysis lab.⁶ Through projects analyzing failed components, as well as research initiatives aimed at fundamental studies of failure mechanisms and prevention, I have been given a solid introduction to this technical field within the power sector. One area in particular which has interested me greatly in both my internship experiences and an elective metallurgical course has been the study of corrosion. With damage from corrosion costing in excess of \$100 billion in the United States annually,⁷ improvements in corrosion resistance offer tremendous rewards to society in the form of safer infrastructure and more economical alternatives to frequent replacements of corroded components. I intend to pursue a career as a failure analysis engineer following graduate studies. My hope is to specialize in the prevention of corrosive and mechanical material failures. I plan to continue my involvement in materials engineering societies such as TMS and ASM International, and aspire to further leadership roles within these interdisciplinary societies in the materials field. As I have done on a smaller scale throughout my years as an undergraduate, I would like to spread excitement for the materials engineering discipline to new heights; heights which encompass groups currently excluded, in large part, within the engineering community. I believe that exciting and inspiring high school students to pursue careers in engineering fields is the most effective means of ensuring the safety and prosperity of our society at large, and the funding and resources of an NSF Fellowship would open new opportunities for my continuation and growth in scientific research and broader societal impacts.

³ Tau Beta Pi Southeastern Regional Conference, Hosted by Vanderbilt University in Nashville, TN 2011

⁴ The selected school for AP Calculus Tutoring was located in a rural area of Alabama, a demographic highly underrepresented in the sciences at the college level.

⁵ TBP students have been asked back for following years after an increase in the pass rate of the AP exam was noticed for students tutored through our program.

⁶ Worked as Metallurgical Engineering Intern at the ALSTOM Materials Lab (Summer 2011, Summer 2012)

⁷ As reported by Denny A. Jones in his text entitled *Principles and Prevention of Corrosion*