

## McNair Scholars Program prepares students for the PhD program in materials research

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Each summer, approximately 20 juniors and seniors in undergraduate school begin an intensive research experience with our University of Florida (UF) Ronald E. McNair Post-Baccalaureate Achievement Program. These first-year McNair Scholars take a course on research methods and writing, complete a preparation class for the Graduate Record Exam (GRE), and attend seminars in addition to working on a faculty-guided research project that continues throughout the academic year.

The McNair Scholars Program is named in honor of Dr. Ronald E. McNair, the African American astronaut and physicist who died tragically along with six other crew members in the 1986 Space Shuttle *Challenger* explosion. The program is one of several US Federal TRIO Programs that provide outreach and services to students

from disadvantaged backgrounds to aid their advancement through the academic pipeline from middle school, to high school, to college, and to graduate programs. McNair programs were established by the US Department of Education to increase the number of students from underrepresented segments of society to obtain a PhD degree and to encourage their entry into faculty and research careers.

The UF McNair Scholars Program is one of 151 such programs across the United States and Puerto Rico that collectively provide graduate school preparation and training to over 4000 undergraduate students who are low-income/first-generation college students or who are members of groups that are traditionally underrepresented in graduate education. Now in its 20th consecutive year of funding, the UF McNair program has served close to 450 outstanding scholars.

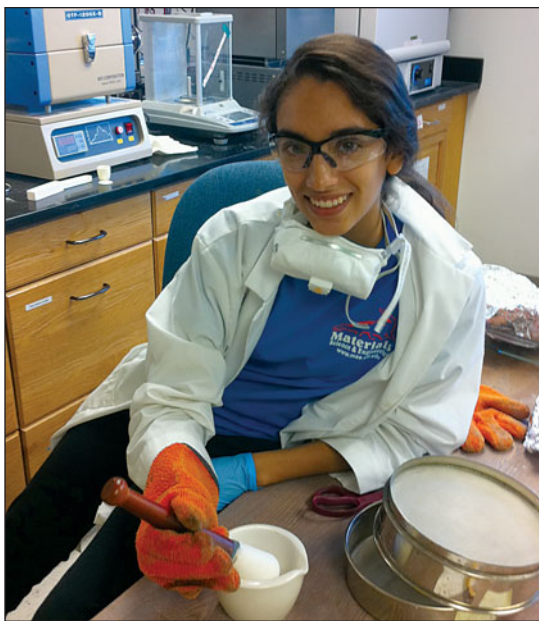
Our program has supported undergraduate students from a variety of academic disciplines; however, the growing national demand for scientists and engineers has fueled our efforts to emphasize recruitment of students majoring in science, technology, engineering, and math (STEM). A number of our STEM students over the years have worked on innovative research in materials science, a field that is near and dear to my heart.

As Director of the McNair Scholars Program, I look for students with strong academic credentials who have the passion and drive to complete doctoral studies.

Some of these students enter the program with extensive research experience and solid career goals, like Carmen Gil, a junior majoring in chemical engineering. In the summer of 2012, Gil was part of the first cohort of the International Research Experience for Students at the University of New South Wales (UNSW) in Sydney, Australia, where she conducted research on thermoelectric materials for energy technology. She spent two additional semesters at UNSW in 2014 through the Engineering Exchange Program and published a first-author article in the *Journal of Physics: Condensed Matter*. As a McNair Scholar, Gil is currently researching three-dimensional printing of soft biomaterial structures with her McNair mentor Tommy Angelini, and she aspires to pursue a PhD degree in biomedical engineering.

Other students enter our program as diamonds in the rough who are new to research and have the desire to attend graduate school, but need the support and training provided by our program to help nurture their potential. These are students like Estefania Alvarado, an environmental engineering and agricultural and biological engineering double-major who began the program in May 2014. Under the guidance of Brij Moudgil, Alvarado is investigating the use of soft nanoparticles of antimicrobial agents as a treatment for Huanglongbing disease, also known as citrus greening. After only two months in the program, Alvarado had the confidence to give her first oral research presentation at a national conference for McNair Scholars. She is currently applying to doctoral programs in materials science and engineering and very excited about what the future will bring.

McNair programs must track and report on former participants for 10 years following completion of a bachelor's



2015 National Science Foundation Graduate Research Fellowship Program recipient and proud graduate of the UF McNair Scholars Program, Lyndsey Denis.



Left Photo: Anthony Brennan (left), Professor of Materials Science and Engineering, stands proudly with his McNair Scholar mentee Danessa Domingo (holding Sharklet biomimetic technology model) and fellow committee members Jennifer Drew and Samesha Barnes after Danessa's successful senior thesis defense. Right Photo: McNair alumna Samantha Andrews (left) gives current McNair Scholars Danisha Baro, Jewel Cumberbatch, and Estefania Alvarado a tour of Georgia Tech's campus.

degree to gauge their success in meeting targets for graduate school enrollment, retention, and doctoral degree attainment. As a result of the long-term follow-up, our staff typically maintains a strong relationship with our alumni, which has aided in connecting current McNair Scholars with McNair graduates in their respective disciplines. Among the many successful alumni our program has served is Samantha Andrews who completed her bachelor's degree in materials science and engineering at UF in 2004. Andrews earned a PhD degree in biomedical engineering in 2010 through a joint program between the Georgia Institute of Technology and Emory University.

I had a chance to catch up with Andrews last summer while attending a national McNair conference in Atlanta, Ga., where she was in the final months of a post-doctoral position with the Georgia Tech Center of Education Integrating Science, Mathematics, and Computing and the Nanotechnology Research Center. During her postdoc, Andrews developed Race to the Top online science courses for students and teachers, including an introductory materials chemistry course for students who have completed Advanced Placement Chemistry. Andrews accepted a full-time position in July as Associate Director of Instruction of the Biomedical Science Pathways for Project Lead the Way, where she now develops biomedical science curriculum for students from kindergarten through high school. She is also an adjunct professor at Georgia Gwinnett College.

Andrews credited her participation in the McNair Scholars Program for helping to achieve her goal of attending graduate school. She said that the continual tracking throughout her graduate career encouraged her to finish.

Several of our recent graduates are also making an impact in materials research as doctoral students at prestigious institutions. Alumna Lyndsey Denis began conducting research as a first-year student at UF, first working under the supervision of Jacob Jones, and continuing research with Michele Manuel, who served as her McNair faculty mentor. Denis—now a first-year doctoral student in materials science at The Pennsylvania State University—said that the program strengthened her application to graduate school. It also gave her visibility in the electroceramics community by providing funding to present her research at national conferences, like The Minerals, Metals and Materials Society Annual Meeting and Exhibition.

Jimmy Wu, who was in the same McNair cohort as Denis, was among the inaugural graduating class of UF's Undergraduate Biomedical Engineering Program in May 2014. As a McNair Scholar, Wu worked with mentor Jon Dobson to optimize nanomagnetic transfection of mesenchymal stem cells for potential use in tissue engineering and regenerative medicine applications. According to Wu, the McNair Scholars Program inspired him to take the necessary steps to become a scholar and

leader, words he put into practice by continuing his education as a doctoral student in bioengineering at the University of California—Los Angeles.

Juan Lopez, who was a year ahead of Denis and Wu, is a second-year materials science and engineering doctoral student at the University of Michigan. His graduate research on spintronic semiconductors is currently featured on the website of the College of Engineering.

The UF McNair Scholars Program is making a difference in the lives of future faculty and researchers by giving promising students the tools, support, and confidence to pursue graduate studies. I was extremely proud to learn that five of the UF's 2015 NSF Graduate Research Fellowship Program recipients are current and former McNair Scholars, including Lyndsey Denis and Juan Lopez. Jimmy Wu also earned an Honorable Mention for his proposal.

These prestigious honors are indicative of the caliber of students who come through our program and are a result of the collaborative efforts between the students, their research mentors, and the McNair staff. Our program has a rich, 20-year legacy of developing leaders through graduate school preparation. I look forward to the next 20 years!

*Samesha R. Barnes is Director of the Ronald E. McNair Scholars Program at the University of Florida, where she earned Master's and PhD degrees in materials science and engineering.*