

Grant Recipient Report

Steel Curriculum Development Grant

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This project intends to attract freshman and sophomore students into the iron and steel industry by providing necessary knowledge and skills to succeed in completing the degree and starting a career in this industry.

Georgia Southern University is a fast-growing university in Georgia, and the College of Engineering and Computing currently has approximately 4,000 students. After hiring two ferrous metallurgists, Drs. Mingzhi Xu and Jingjing Qing, in 2018, Georgia Southern's iron and steel program has attracted great attention across the nation. Drs. Xu and Qing have received AIST Kent D. Peaslee Junior Faculty Awards in 2020 and 2021, respectively. The university has established great relationships with regional and national chapters from AIST and the American Foundry Society (AFS). Scholarships, seminars, conferences, and plant tours to steel mills and foundries are regularly offered to the students through course and extracurricular activities. In addition, two brand-new courses (MENG5831 Applied Metal Casting, and MFGE 5533 Steel Heat Treatment and Microstructure) were added to the curriculum and have received great feedback from the students and industry.

Georgia Southern has recently become one of the nation's 20 Foundry Education Foundation (FEF)-certified schools, and it is the only FEF-certified school across Florida, Georgia, South Carolina and North Carolina. Georgia Southern also has an American Foundry Society student chapter and a Material Advantage chapter that involves more than 40 active student members participating in internal and external events regularly.

In addition, the university has been providing tremendous support to the metallurgical education program; for example, the university has invested over US\$300,000 for establishing its current ferrous foundry. From 2018 to 2023, Georgia Southern's foundry has seen over US\$1 million in investments for lab space and equipment from the university, industry, AIST, AFS and FEF. The foundry and its supporting facility now have the capabilities of alloying designing, simulation, molding, casting,

heat treating, machining, forging, chemistry analysis, metallography and mechanical testing. The foundry melts over 4,000 lbs. of ferrous alloys each year for various student projects and class activities.

Georgia Southern University is now known for the metallurgy education that focuses on building strong hands-on skills and preparing students for real work environments. So far, more than 30 students have entered the iron and steel industry through jobs, internships and co-ops. Because of the great success with the fast development on the iron and steel education, the university has recently approved an emphasis on metalcasting for the mechanical engineering B.S. degree. After completing three courses focused on metallurgy, metalcasting and steelmaking, the mechanical engineering students can graduate with the metalcasting emphasis on their diplomas. The newly added course, ENGR 2436: Molten Metal Processes, is the first course to start their journeys in pursuing the metalcasting emphasis. The course is designed to capture students that are already interested in iron and steel, and to attract more students into the iron and steel industry through lectures, hands-on labs, industry interactions and plant tours. After taking this course, students are expected to have a basic understanding of iron- and steelmaking history and modern processes utilized in the industry. Students will also gain necessary skill sets and experience working with molten metal, including aluminum, cast iron, and steel. During the first year, Dr. Xu has developed the course syllabus and detailed course/lab plans. The textbooks and course/lab contents have been discussed extensively with the Georgia Southern's FEF industry advisory board, which consists of 20 professionals from national iron and steel producers and suppliers, including Nucor and ArcelorMittal. The board has provided valuable input on the course structure. ♦