Tarrant County College Student Success Center

ABSTRACT

Engineering students in their capstone year were placed in interdisciplinary teams and assigned to engineer the complete design for the Student Success Center on the Tarrant County College campus in Fort Worth, Texas. The building is a three-story, 153,490 square foot structure that contains classrooms, administration spaces, and a large atrium. Additional design challenges requested by the client were to provide resiliency to handle natural disasters; emergency planning for utilities; and overall building performance enhancements.

Three different student engineering teams took on this challenge during their two-semester capstone course. Before being allowed to enroll in the course, all students took the FE Exam. Additionally, each student took the Gallup Clifton Strengths finder, to begin to understand where they best fit into professional team roles. This course and project are meant to give the students nearly a year to practice as if on a team of professional engineers. Interdisciplinary student engineering teams were mentored by a large number of professionals from engineering, architectural, and construction firms. Mechanical, electrical and lighting, and structural professional engineers were assembled into teams, with each team of professionals assigned to one of the student teams. There were several specialty professionals allowed to mentor all teams for special systems development, code compliance, and other specialized considerations.

Another set of professionals from across the engineering and construction industry throughout the United States volunteered to view and evaluate several touchpoint deliverables presented by each team. Evaluators used a strict rubric to give feedback on team collaboration plans; research; schematic engineering (SD); engineering development phases 1, 2, and 3 (DD1, DD2, DD3), and the resulting set of construction documents (CD). Student teams employed their classroom learning, and knowledge and skills learned from internship and other team experience to create engineered designs that meet and exceed the standard requirements in professional practice.

Solutions developed by interdisciplinary engineering design teams were code-compliant and achieved gold-level ratings for both LEED and WELL certifications. Spatial daylight autonomy was increased to as much as 67%. A lot of attention was paid to creating a campus facility to act as a community shelter in storms and emergencies, and in the case of extreme emergency, a portion of the building is a saferoom capable of full off-grid operation for two days, and 20-40% continuous off-grid operation for at least another five days. The entire structure is engineered to withstand an EF3 tornado, with the safe room (also housing essential systems) able to withstand the highest-rated, EF5 tornado.

Of utmost importance from this experience is the ability to apply and hone the skillset needed for professional practice. Students come to understand the enormous amount time and effort that was donated by the professional volunteers. Complete engineering education includes teamwork, professionalism, and a spirit of service. Students in this capstone course are taught the value of community effort, and learn the importance of connecting engineering education with professional practice. The students who participated in this year's capstone experience received over 2000 hours of time input by a total of 59 professional volunteers, which they calculated to be equivalent to over $330,000 in billable time. Together, these 59 professionals contributed a full academic year to aid in the students' transition from applying coursework knowledge from their educational careers to becoming fully prepared for professional practice. The following pages describe a professional-level complete design that demonstrate the students' growth and preparation for professional practice.