Designing Advanced Air Mobility Infrastructure: Multidisciplinary Capstone Project

Advanced Air mobility at real world project site: Student teams engineered infrastructure solutions for an actual general aviation and reliver airport to accommodate the operational needs of an emerging travel mode, electrical Vertical Take Off and Landing (evTOL) aircraft. Industry forecasts, involving high-profile mobility providers and manufacturers, for eVTOL mobility, capital investment, and wide-scale impact indicate airport infrastructure requirements comprise an essential network component.

Student Collaboration on Deliverables: Civil engineering and construction engineering student teams work collaboratively to address 1.) travel demand forecasting, 2.) airfield operations and design, 3.) ground transportation and traffic engineering, 4.) environmental engineering, 5.) airfield right-of-way, security and site restrictions, 5.) terminal structural design, 6.) terminal geotechnical and pavement design, 7.) airfield storm water drainage design, 8.) project value engineering, 9.) construction impacts and site safety , 10.) project phasing and scheduling, and 11.) project cost estimating. Student teams identified a preferred alternative, developed designs to meet governing criteria, prepared engineering deliverables, and presented findings to an expert panel of professional engineers, within the context of a public meeting. Additionally, students provided a detailed technical briefing to a U.S. House of Representatives Congresswoman, who serves on the House Subcommittee on Aviation, and to state Aeronautics Commission Board members, Executive Director and senior engineers.

Licensed Professional Engineers: Over a two-semester capstone design project, student teams collaborated with eight (8) professional engineers to develop and evaluate designs and three (3) licensed professional engineer faculty who taught the course. Furthermore, professional engineers, jurisdictional authorities, and industry experts provided guest lectures and design guidance for each project disciplinary field. Expert review panels were conducted at the end of both semesters where student teams presented project design findings. At the end of fall semester student teams presented detailed alternative analysis, selected a preferred alternative based on an objective engineering analysis, and prepared a wetland permit application. At the end of spring semester student teams presented detailed airfield and infrastructure designs including engineering, construction and project management. Expert review panels asked questions indicative of public meetings, evaluated presentations, ranked winning presentations, and provided invaluable feedback.

Knowledge and Skills Gained: Students learned to synthesize realistic design standards, to use an engineering process to evaluate alternatives, and to meet desired needs through development of design drawings, specifications, cost estimates, and project schedules. Deliverables were created within realistic constraints including environmental, social, political, ethical, health and safety, constructability and sustainability, and provide a viable engineering design to meet specific needs of the community.