

Civil Matters

Kansas State University Department of Civil Engineering

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Steel bridge team member constructs
"Steel Willie VIII" — story on page 7

Graduating seniors practice civil engineering in “real-life” project

Every semester, the graduating class works on a senior design project that is either ongoing in the city of Manhattan, or is expected to be implemented in the near future. This capstone course is required in the CE curriculum and is taken by all students in the semester in which they graduate. It is intended to provide an experience that integrates various design areas in a comprehensive, open-ended project. This typically involves designing elements from the various areas of transportation, water resources environmental, geotechnical and structural engineering. The design involves incorporating appropriate engineering standards, economic considerations and multiple realistic constraints while considering criteria such as impact on the natural environment, sustainability, constructability, ethics, public health and safety, social impact, esthetics and political context. In the class, design problems of current interest in the Manhattan area involving actual local sites are selected to emphasize the real-world character of the work expected of the students.

The class is divided into design teams of four to six members. Teams are organized so that members complement their design experience in various civil engineering sub-areas. During the semester, each student serves as chief engineer of the design team for a particular design task. As chief engineer, he or she is responsible for preparing weekly/biweekly written and oral progress reports, as well as presenting oral and written task reports at the end of a major task. Chief engineers also assign work to the members of their teams and submit



Capstone-course team members perform a site visit in Manhattan to develop project plans.

written evaluations of each of the design team members at the end of the task. Design team members, in turn, evaluate the work of the chief engineer and the oral task reports. All members of the design team collaborate in preparation of a final written project task report.

The course also includes a seminar series that leads to a general understanding and appreciation of the professional, social and ethical responsibilities of the practice of civil engineering. Reading assignments are selected every week and discussed during a portion of the weekly class meetings. Individual students are assigned on a rotational basis to lead the discussion. Outside engineering professionals are also invited once or twice a semester to present topics related to professional development and the various aspects of engineering practice.

The professor-in-charge organizes and conducts the course. Other faculty members serve as primary consultants for each of the various design tasks. Quite often and almost every semester, practitioners from industry and consulting firms get involved in the course, providing input and advice to the students. All departmental faculty, practitioner advisors and graduate students are invited to the oral presentations, and evaluate and critique the presentations. The students seek input from other consultants, both on and off campus, as needed during the semester, and outside speakers with knowledge and experience relating to the assigned project are occasionally invited to facilitate interactions with the project teams.

The spring 2013 semester has 35 graduating seniors. The project is

about modifying the city lot at 3131 Anderson Avenue in Manhattan from a fire and rescue station to a utilities operation facility. It will need to house the service and maintenance vehicles, and serve as the base for the maintenance crews and their equipment. The class activity starts with a site visit to explore the site conditions and existing topography and land use.

The subject lot must be redeveloped in conformance with local ordinances and engineering standards. A site layout is to be developed to use the available space efficiently. The transportation engineering aspects include site access and internal circulation, service vehicle parking, public/visitor and employee parking, and public/employee access to buildings. Pavement will need to be designed as well as adequate drainage of storm water.

This also includes developing a utility plan to provide additional water and sewer service to a wash rack for the utilities vehicles.

Structural and foundations aspects include constructing an additional structure needed as a garage/shop for the utilities vehicles. The required area will be a partially enclosed floor space, directly accessible from the driveway or parking lot. Structural aspects include determination of the

design loads and the material(s) of choice for construction, and the design of different structural components that will be used in the structural system. Foundation aspects include identification of soil properties, selection of type of foundations and design of those foundations, as well as any earth-retaining walls that might be necessary. Detailed cost estimates are required.

Distance education master's degree courses

The civil engineering department offers graduate-level courses leading to a master of science degree in civil engineering to off-campus students—no matter where they live. All courses needed for the degree will be offered online or by other multimedia delivery methods. Students only need to travel to K-State once,

at the end of their program, for an oral examination conducted by their graduate committee. A master's degree can also be counted as a year of credit toward earning a professional engineering license. For information on earning this license, go to the Kansas Board of Technical Professions online at <http://www.kansas.gov/ksbtp/>.

Summer 2013

- CE 703 Responsibility in Engineering: Codes and Professionalism
- CE 704 Responsibility in Engineering: Leadership and Diversity
- CE 790 Prb/Engineering Ethics Case Studies

Fall 2013

- CE 654 Design of Groundwater Flow Systems
- CE 690 Top/Basics of Engineering Ethics
- CE 704 Responsibility in Engineering: Leadership and Diversity
- CE 732 Advanced Structural Analysis I
- CE 742 Advanced Steel Design
- CE 745 Structural Dynamics
- CE 752 Advanced Hydrology
- CE 766 Wastewater Engineering/Biological Processes
- CE 775 Traffic Engineering
- CE 777 Portland Cement Concrete Pavements
- CE 786 Land Development for Civil Engineers and Planners
- CE 790 Prb/Sustainability and Green Engineering
- CE 816 Topics/Modern Roundabout Analysis and Design
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Competitors line up for the coed sprint concrete canoe heat. Mohammed Ali, Saudi Arabia; Brianna Krysztof, Baldwin, Kan.; Nathan Pohl, Hutchinson, Kan.; and Jenny Swabb, Basehor, Kan., second hull from top, race for K-State.

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