AREN 4830: SP TPC: BUILDING ENERGY AUDITS (3), Krarti
Provides students with the fundamental tools and procedures required to perform energy audits of building systems typically required for energy efficiency projects including performance contracting and retro-commissioning projects.

AREN 5830: SP TPC: BUILDING ENGINEERING MODELING AND SIM (3), Krarti, Scheib, Zhai
This is an introduction course for new graduate students entering the Architectural Engineering Program (AREN) but without a general Civil or Architectural Engineering background. This course is part of a two-course series with AREN 5001: Building Science and Engineering I. This course covers two parts: (1) building thermal science, which will present the fundamentals and applications of heat transfer and flow mechanisms in buildings (including heat transfer principles, heat transfer through envelope and fenestration, heat transfer via ventilation and infiltration, solar heat transfer, building load calculation, thermal comfort, and indoor air quality); (2) building material science (including a review of static equilibrium, mechanical stress, shear and bending moment diagrams, cement chemistry, concrete durability, wood and corrosion science, fracture and fatigue in metals, and an introduction to life cycle assessment). The course will prepare students with general knowledge and skills that are required by advanced technical courses offered by AREN.

AREN 5830: SP TPC: Advanced Lighting Design (3), Vasconez
In Illumination II, you will study the fundamentals of architectural illumination with an emphasis in design and application. The course introduces and applies basic principles and vocabulary to problems in the lighting of environments for the performance of visual work, the proper interaction with architecture, and compliance of energy requirements.

CVEN 4833/5833 Special Topic: Analysis of Urban Water Systems (3), Bhaskar
The course examines water systems in the urban environment in an integrated manner rather than in isolation. Subjects emphasized are the intersection of water supply, wastewater collection, stormwater management, groundwater, and surface water. Focus is placed on analyzing the behavior of urban water distribution and collection systems using model applications. Students completing this course will be able to understand local urban water resources problems, effectively use complementary urban water models, and examine the interactions between water supply, drainage systems, surface water, and groundwater.

CVEN 4837 Special Topic: Outdoor Lighting (3), Vasconez
- **Outdoor Lighting, on campus** (1)
  Introduces fundamental principles of outdoor, exterior and landscape lighting including night vision, design guidelines and application, lighting equipment, and lighting standards and codes. On-campus learning is complemented with a field trip to a luminaire manufacturer.
- **Outdoor Lighting, off campus** (1)
  Visit to luminaire manufacturer (Santa Barbara, CA) focuses on the life cycle of luminaires, including material selection, manufacturing processes, the tenets of product management, and construction coordination needs as the basis to understanding lighting principles of and best practices for outdoor lighting application and design.

CVEN 5833 Special Topic: Surface Groundwater Exchanges (3), Gooseff
This course is a survey of the many ways in which surface water (wetlands, oceans, lakes, and streams) interact with groundwater. We will cover the processes of physical exchange between surface and subsurface water bodies and the implications for water quality.

CVEN 5835: SP TPC, Design of Wood Structures (3), Srubar
What are the physical and mechanical properties of wood that make it such a remarkable building material? How do these properties affect structural performance? How do engineers design safe and serviceable wood structures? Using a fundamental skillset in statics, mechanics of materials, and structural analysis, Design of Wood Structures introduces...