AREN 4830: SP TPC: BUILDING ENERGY AUDITS (3), Dabbagh
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. This class has been cancelled for Spring 2023.

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
upper-level undergraduate and graduate students to the design and analysis of code-compliant wood structural members and connections. In this lecture course, we will explore the design of safe and serviceable wood structures, namely beams, columns, beam-columns, diaphragms, shear walls, and connections. After a brief review of structural analysis, this class will focus on light-framed low-rise wood building elements constructed of sawn lumber or engineered wood. Concepts related to heavy timber-framed structures and tall wood buildings using cross-laminated timber (CLT) are also introduced.

CVEN 5836 Special Topic: Building Information Modeling for Capital Projects (3), Celoza
This course focuses on building information modeling (BIM) for buildings-type projects. Students will gain knowledge on the implementation of BIM throughout a building’s lifecycle, from planning and design through construction and operations. This project-based course covers topics including setting up projects for success, model-based cost estimating, and design coordination.

CVEN 5837 Special Topic: Community Appraisal (1), Salvinelli
This course will provide conceptual and methodological tools that can be employed by students engaged in global engineering in different phases of international development projects and studies, and prepare students to undertake a field study in a foreign country. Community appraisal methods will be presented with emphasis on participatory research approaches, need assessment tools, and ethnographic methods; related cultural, ethical and personal issues will be also discussed. Furthermore, students will be introduced to secondary data gathering, and the usage of the main data resources on food and water security, energy access, and health status.

CVEN 5837 Special Topic: Program and Project Mgmt (1), Salvinelli
This course will cover the principles, practice and phases of international development program and project management including identification, design, execution, monitoring and evaluation, exit strategy, and scaling up. Emphasis will be placed on specific challenges and constrains related to the multidisciplinary, dynamic and complex nature of development projects. Students will be exposed to a number of methodologies and tools for planning, participation and evaluation commonly used to identify needs and promote social change, including the Theory of Change and the Logical Framework Approach.

CVEN 5837 Special Topic: Sol’n Ident and Proposal Wrtg (1), Salvinelli
This is a project-based course. An overview of strategies and best practices to develop effective grant proposals for international development interventions, and major funding mechanisms and processes will be presented. Each team of students will work with a local or international NGO to identify a potential donor and create a grant proposal for an international development program or project. The proposal will be based on the information provided and collected about the local context and on the NGO’s experience and expertise; it will also have to respect priorities and requirements of beneficiaries, principles and goals of the NGO, and guidelines of the donor.

CVEN 5837 Special Topic: Study Design and Impact Evaluation (1), Salvinelli
This course will review the methods, tools, instruments, and procedures often employed in evaluating and improving global development interventions. Students will be introduced to the main types of study design, including observational and experimental studies, and the conditions under which each may be used. Ethical consideration faced when conducting research on human subjects and the compliance process to obtain approval from the Institutional Review Board will be presented. The course will include the analyses of case studies showing strengths and weaknesses of monitoring and evaluation and impacts in policy-making; project-based activities to train the students to select and apply the appropriate methods for a specific scenario; and active learning techniques (readings, discussions and debates) to challenge the students to develop a critical mindset in order to identify and counter unfair practices.

CVEN 5838 Special Topic: Intro to Dvlp Econ for Engineers (1), Platais
The course will address main development topics based on a theoretical framework applied to practical real-life examples with a focus on the contribution of engineering to these solutions. The format of the class will be guided by analysis and in class discussions to provide a multi-sectoral approach. Students will be introduced to basic economic theory and how it applies to economic development to better understand the conditions of poverty. Furthermore, students will also examine how the role of engineering intersects the solutions space. Some of the questions to be addressed include: Why do developing countries have poor health, high child mortality, face extreme poverty, low levels of education, and high levels of child labor? Which, if any, policies are effective in alleviating these problems? Emphasis will be placed on analyzing current economic issues and policies in their historical context. The course is organized around a series of key themes, which will be explored with reference to societies and their histories. The process of economic reform, agricultural and industrial development, income distribution, health and education and international economic relations will be scrutinized to identify the negative and positive advances that have been accomplished internationally thus far.
The key cross-cutting themes are:

- Theories of economic development: What are the causes of economic growth as well as the barriers to development? How do we best explain sustained economic development, and what are the limitations of these theories? How does engineering intersect in this space? What are the impacts of health crises and environmental challenges?
- International development assistance (aid): Its critical role and how this has contributed (or not) to assisting countries improve their circumstances and of their people. The differences between different donor government agencies will be explored.
- Modalities of development assistance: Supporting economic development through programs, budget assistance and projects. Logical Framework Approach and capacity building tools.

EVEN 4830/CVEN 5834 Special Topic: ENV Impact Assessment (3), Almeida Guerra

This course will provide students with the most relevant elements on what is needed to develop an environmental impact assessment (EIA). It seeks to familiarize the student with the terms and definitions used in the environmental practice. The course also explains the application of well-known methodologies/tools used in EIA studies, taking into consideration the cause-effect relationships between the project activities and the existing environmental components (water, air, soil, society).

The course explores the importance of matrixes development for the evaluation of the environmental impacts and the subsequent elaboration of Environmental Management Plans. A series of exercises will be performed as part of the course where the students are expected to apply their analytical criteria to identify the major impacts of projects and to propose suitable mitigation measurements.