

ARCHITECTURAL ENGINEERING - PROFESSIONAL MASTER OF SCIENCE (MSAE)

The architectural engineering master's program in the Department of Civil, Environmental & Architectural Engineering offers its students seven disciplinary areas they may pursue for a comprehensive foundation of architectural engineering skills to be successful in their field of interest. These include:

- Building energy
- Data science for buildings
- Building decarbonization
- Lighting and day lighting
- Indoor environmental quality for buildings
- Structural engineering
- Construction engineering & management

Students are expected to complete 30 credit hours to meet the requirements of the Architectural Engineering Professional MS degree. Typically, students can successfully complete the degree requirements within 12–18 months. Each subplan in the Architectural Engineering Professional MS curriculum comprises core (required) courses and a set of elective courses depending on the desired focus area that must be selected in consultation with an academic advisor.

For more information on the degree each subdiscipline the program has to offer, visit the AREN Professional MS Degree (<https://www.colorado.edu/ceae/architectural-engineering-professional-ms-degree/>) webpage.

Requirements

Required Courses and Credits

As alternatives to some of the elective courses, up to 6 credit hours in independent studies can be considered by the students to enhance their professional skills in any of the focus areas listed below.

Data Science for Buildings Subplan

Code	Title	Credit Hours
Required Courses		
AREN 5001	Building Science and Engineering I	3
AREN 5002	Building Science and Engineering II	3
EMEN 5020 or CVEN 5006	Finance for Engineering Managers Construction Engineering and Management Fundamentals	3
AREN 5030	Data Science for Energy and Buildings	3
CVEN 6833	Special Topics (Advanced Data Analysis Techniques)	3
CVEN 5546	Artificial Intelligence for Built Environment Systems and Applications	3
Elective Courses		

Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. 12

Building Energy Subplan

Code	Title	Credit Hours
Required Courses		
AREN 5001	Building Science and Engineering I	3
AREN 5002	Building Science and Engineering II	3
EMEN 5020 or CVEN 5006	Finance for Engineering Managers Construction Engineering and Management Fundamentals	3

Select two of the following:

AREN 5010	Energy System Modeling and Control	
AREN 5080	Computer Simulation of Building Energy Systems	
AREN 5990	Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts	
AREN 5090	Optimizing Grid Connected Systems	
AREN 5830	Architectural Engineering Special Topic (Building Systems Simulation and Modeling)	

Elective Courses

Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. 15

Building Decarbonization Subplan

Code	Title	Credit Hours
Required Courses		
AREN 5001	Building Science and Engineering I	3
AREN 5002	Building Science and Engineering II	3
or		
EMEN 5020 or CVEN 5006	Finance for Engineering Managers Construction Engineering and Management Fundamentals	3
AREN 5660	Embodied Carbon in Buildings	3
AREN 5890	Sustainable Building Design	3

Elective Courses

Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. 15

Lighting and Daylighting Subplan

Code	Title	Credit Hours
Required Courses		
AREN 5001	Building Science and Engineering I	3
AREN 5550	Illumination 2	3
EMEN 5020 or CVEN 5006	Finance for Engineering Managers Construction Engineering and Management Fundamentals	3

AREN 5580	Daylighting	3
AREN 5540	Architectural Exterior and Landscape Lighting Design	3

Select one of the following

AREN 5620	Adaptive Lighting Systems	
AREN 5630	Advanced Lighting Design	

Elective Courses

Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. 12

Indoor Environmental Quality for Buildings Subplan

Code	Title	Credit Hours
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Required Courses

AREN 5001	Building Science and Engineering I	3
AREN 5002	Building Science and Engineering II	3
EMEN 5020 or CVEN 5006	Finance for Engineering Managers Construction Engineering and Management Fundamentals	3
AREN 5990	Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts	3
AREN 5620	Adaptive Lighting Systems	3
MCEN 5141	Indoor Air Pollution	3

Elective Courses

Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. 12

Structural Engineering Subplan

Code	Title	Credit Hours
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Required Courses

CVEN 5111	Structural Dynamics	3
CVEN 5525	Computational Structural Analysis 1	3
CVEN 6595	Earthquake Engineering	3
AREN 5660	Embodied Carbon in Buildings	3

Select one of the following:

CVEN 5575	Advanced Topics in Steel Design	
CVEN 5585	Advanced Topics in Reinforced Concrete Design	
CVEN 5565	Design of Wood Structures	
CVEN 5835	Special Topics for Seniors/Grads (Design of Masonry Structures)	

Elective Courses

Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. 15

Construction Engineering Management Subplan

Code	Title	Credit Hours
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Required Courses

AREN 5001	Building Science and Engineering I	3
CVEN 5006	Construction Engineering and Management Fundamentals	3
CVEN 5656	Building Information Modeling for Capital Projects	3

Select three of the following:

CVEN 5226	Construction Safety	
CVEN 5346	Managing Construction and Engineering Projects and Organizations	
CVEN 5446	Infrastructure Asset Management	
CVEN 5546	Artificial Intelligence for Built Environment Systems and Applications	
CVEN 5246	Legal Aspects of Construction	

Elective Courses

Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. 12

Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of fundamentals of architectural engineering.
- Analyze and develop advanced solutions to improve the performance and/or construction of buildings.
- Communicate knowledge through effective oral presentations and technical writing.