ARCHITECTURAL ENGINEERING - MASTER OF SCIENCE (MS)

Graduate studies in architectural engineering are offered through the Department of Civil, Environmental and Architectural Engineering. The department offers a Master of Science degree with study emphases in several major areas:

- Building systems engineering
- Illumination engineering
- Materials and carbon
- Construction engineering and management

For more information, visit the department's Graduate Studies webpage.

Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the Bachelor's–Accelerated Master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Architectural Engineering - Bachelor of Science (BS) (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/civil-environmental-architectural-engineering/architectural-engineering-bachelor-science-bsare/#acceleratedmasterstext)

Requirements

For a Master of Science (MS) degree in architectural engineering, students may undertake Plan I (with a thesis) or Plan II (with a project).

Up to 6 credits of independent study may be taken, where an individual course of study is worked out between the student and a faculty member. Up to 9 credits of graduate courses can be transferred from another institution. Students are allowed up to 6 credits in total of non-technical coursework for the MS/PhD degree.

Degree Plans

Plan I: Thesis Option

Plan I requires 24 credits of coursework, plus 6 credits of thesis work. The thesis is a formal research report that discusses an organized research topic. Experience has shown that it takes a student from 24 to 30 months to complete this plan. Financial support is generally limited to exceptionally well-qualified students selecting Plan I.

Plan II: Non-Thesis Option

Plan II requires 27 credits of coursework, plus 3 credits of MS project work. The 3-credit Master’s Report (AREN 6960) is related to an applied research AREN topic. It can be successfully completed in 18–24 months by a diligent student. Note that one-half of the coursework must be taken in the CEAE Department (an exception may be made if the relevant courses were taken as part of an undergraduate degree).

With the approval of the advisor, non-CEAE courses at the 4000 level may be used for graduate credit up to a maximum of 6 credits.

Course Requirements

Courses offered in the architectural engineering graduate program may be separated into four focus areas, one specific to the Construction Engineering & Management discipline and three related to the Building Systems Engineering discipline. Students may decide to concentrate in one of these focus areas, or they may wish to take a broad selection from the courses; there is no requirement for picking any specific focus area under the general focus area option.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AREN 5001</td>
<td>Building Science and Engineering I</td>
<td>6</td>
</tr>
<tr>
<td>AREN 5002</td>
<td>Building Science and Engineering II</td>
<td>6</td>
</tr>
<tr>
<td>AREN 5890</td>
<td>Sustainable Building Design</td>
<td>6–9</td>
</tr>
<tr>
<td>AREN 5990</td>
<td>Computational Fluid Dynamics (CFD) Analysis for Built/Natural Environments</td>
<td>6–9</td>
</tr>
<tr>
<td>AREN 5830</td>
<td>Architectural Engineering Special Topic (Building Systems Modeling and Simulation)</td>
<td>6–9</td>
</tr>
<tr>
<td>AREN 5030</td>
<td>Data Science for Energy and Buildings</td>
<td>6–9</td>
</tr>
<tr>
<td>CVEN 5006</td>
<td>Construction Engineering and Management Fundamentals</td>
<td>6–9</td>
</tr>
</tbody>
</table>

Focus Area: Building Energy Engineering

- AREN 5010 Energy System Modeling and Control
- AREN 5020 Building Energy Audits
- AREN 5060
- AREN 5080 Computer Simulation of Building Energy Systems
- AREN 5110 Building Energy Systems Engineering
- AREN 5570 Building Electrical Systems Design 1
- AREN 5090 Optimizing Grid Connected Systems
- ECEN 5007 Special Topics (Data Analytics and Decision-making for Power Systems)
- ECEN 5007 Special Topics (Renewable Energy Future of Power Grid)
- ECEN 5007 Special Topics (Power Systems Planning and Optimizations)

Focus Area: Illumination Engineering

- AREN 5130 Optical Design for Illumination and Solid State Lighting
- AREN 5550 Illumination 2
- AREN 5560 Luminous Radiative Transfer
- AREN 5540 Architectural Radiative Transfer
- AREN 5580 Daylighting
- AREN 5620 Adaptive Lighting Systems
- AREN 5630 Advanced Lighting Design

Focus Area: Materials and Carbon

- AREN 5650 Forensic Engineering
CVEN 5835  Special Topics for Seniors/Grads (Design of Wood Structures)
CVEN 5835  Special Topics for Seniors/Grads (Design of Masonry Structures)
AREN 5660  Embodied Carbon in Buildings
CVEN 5831  Special Topics (Construction Materials)

**Focus Area: Construction Engineering & Management**
CVEN 5246  Legal Aspects of Construction
CVEN 5276  Engineering Risk and Decision Analysis
CVEN 5226  Construction Safety
CVEN 5346  Managing Construction and Engineering Projects and Organizations
CVEN 5446  Infrastructure Asset Management

**Graduate Certificate in Global Engineering**
Students admitted to the Graduate Certificate in Global Engineering program (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/civil-engineering/engineering-developing-communities-graduate-certificate/) must fulfill the coursework and practicum requirements of that program. For AREN students, up to 6 credits of the required certificate coursework can count as coursework needed for the PhD degree.