ARCHITECTURAL ENGINEERING - MINOR

The undergraduate minor in architectural engineering serves CU Boulder students who are interested in building science, engineering and system designs. The minor is intended to expose students to basic building science knowledge, engineering and system concepts, and calculation and design skills.

Requirements
Admission
A cumulative GPA of 2.750 or higher is required to be admitted to the minor.

The minor is not open to students pursuing the Bachelor of Science in architectural engineering or the Bachelor of Science in Engineering Plus with an architectural engineering disciplinary emphasis. In addition, the structural systems and construction engineering and management tracks (shown below) are not open to students pursuing the Bachelor of Science in civil engineering or the Bachelor of Science in Engineering plus with a civil engineering disciplinary emphasis.

Prerequisites
The following prerequisite courses are required, with a grade of C- or higher in each. A student may be accepted into the minor with no more than two of these courses as deficiencies. All deficiencies must be completed before the minor is awarded.

- Calculus 1 (APPM 1350, MATH 1300 or APPM 1345)
- Calculus 2 (APPM 1360 or MATH 2300)
- Calculus 3 (APPM 2350 or MATH 2400)
- Differential Equations and Linear Algebra (APPM 2360, or MATH 2130 and MATH 3430)
- Two semesters of calculus-based physics (PHYS 1110 or PHYS 1115, and PHYS 1120 or PHYS 1125)
- Statics (CVEN 2121, ASEN 2001, GEEN 2851 or MCEN 2023)

Grade Requirements
A cumulative GPA of 2.250 is required in the courses used to satisfy the minor requirements, with no individual grade lower than C-.

Residency
The minor requires 18 credit hours, at least nine of which must be AREN/CVEN courses completed on the CU Boulder campus. This is composed of three required courses: two courses in a single track plus one elective course.

Course Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AREN 2050</td>
<td>Building Materials and Systems</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3246</td>
<td>Introduction to Construction</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3161</td>
<td>Mechanics of Materials 1</td>
<td>3</td>
</tr>
<tr>
<td>or MCEN 2063</td>
<td>Mechanics of Solids</td>
<td>3</td>
</tr>
</tbody>
</table>

Tracks
Choose one:

### Mechanical Systems Track
- AREN 3010 Energy Efficient Buildings
- AREN 4110 HVAC System Design

### Structural Systems Track
- CVEN 3525 Structural Analysis
- CVEN 4545 Steel Design
  or CVEN 4555 Reinforced Concrete Design

### Electrical Systems Track
- AREN 3040 Circuits for Architectural Engineers
  or ECEN 2255 Introduction to Circuits and Electronics
  or ECEN 3015 Circuits and Electronics for Mechanical Engineers
  or ECEN 3035 Circuits for Engineers
- AREN 4570 Building Electrical Systems Design 1

### Lighting Track
- AREN 3540 Illumination 1
- AREN 4550 Illumination 2

### Construction Engineering & Management Track
- AREN 4506 Pre-construction Estimating and Scheduling
- AREN 4606 Construction Project Execution and Control

### Elective
- ARCH 3214 History and Theory of Architecture 2
- AREN 1027 Engineering Drawing
- AREN 4010 Energy System Modeling and Control
- AREN 4130 Optical Design for Illumination and Solid State Lighting
- AREN 4315 Design of Masonry Structures
- AREN 4530 Advanced Lighting Design
- AREN 4560 Luminous Radiative Transfer
- AREN 4580 Daylighting
- AREN 4830 Special Topics for Seniors/Grads
  (Sustainable Lighting Workshop, Computer Simulation of Building Systems, or Forensic Engineering)
- AREN 4890 Sustainable Building Design
- AREN 4990 Compu Fluid Dynamics (CFD) Analysis for Built/Natural Environments
- AREN 5020 Building Energy Audits
- AREN 5050 Advanced Solar Design
- AREN 5070 Thermal Analysis of Buildings
- CVEN 4565 Design of Wood Structures
- CVEN 5830 Special Topics for Seniors/Grads
  (Distributed Generation Systems, Color Theory/Light Source, or Applied Data Analysis & Modeling)
- ENVD 4352 Special Topics: Computer Methods

Total Credit Hours 18

1. Not open to students pursuing the Bachelor of Science in Civil Engineering or the Bachelor of Science in Engineering Plus with a civil engineering disciplinary emphasis.
2. Only the REVIT section is approved as an elective.