

# ARCHITECTURAL ENGINEERING - PROFESSIONAL MASTER OF SCIENCE (MSAE)

The Professional Master of Science in Architectural Engineering offers contemporary programs of study related to building design and construction.

Students are able to select from one of six focus areas:

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

Students are expected to complete 30 credit hours of coursework to meet the requirements of the MS degree. Each subplan consists of required courses and elective courses that must be selected in consultation with an academic advisor. Students should be able to successfully complete all degree requirements within 12–18 months.

## 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 |
|-------------------------|---|--------------|
| <b>Required Courses</b> |   |              |
| AREN 5001               | Building Science and Engineering I                                | 3            |
| AREN 5002               | Building Science and Engineering II                               | 3            |
| EMEN 5010               | Introduction to Engineering Management                            | 3            |
| or EMEN 5020            | Finance for Engineering Managers                                  |              |
| or CVEN 5006            | Construction Engineering and Management Fundamentals              |              |
| AREN 5030               | Data Science for Energy and Buildings                             | 3            |
| CVEN 6833               | Special Topics (Advanced Data Analysis Techniques)                | 3            |
| CVEN 5836               | Special Topics for Seniors/Grads (AI/ML in the Built Environment) | 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 |
|-------------------------|--|--------------|
| <b>Required Courses</b> |  |              |
| AREN 5001               | Building Science and Engineering I                   | 3            |
| AREN 5002               | Building Science and Engineering II                  | 3            |
| EMEN 5010               | Introduction to Engineering Management               | 3            |
| or EMEN 5020            | Finance for Engineering Managers                     |              |
| or CVEN 5006            | Construction Engineering and Management Fundamentals |              |

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 |
|-------------------------|--|--------------|
| <b>Required Courses</b> |  |              |
| AREN 5001               | Building Science and Engineering I                   | 3            |
| AREN 5002               | Building Science and Engineering II                  | 3            |
| EMEN 5010               | Introduction to Engineering Management               | 3            |
| or EMEN 5020            | Finance for Engineering Managers                     |              |
| or CVEN 5006            | Construction Engineering and Management Fundamentals |              |
| 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 |
|-------------------------|--|--------------|
| <b>Required Courses</b> |  |              |
| AREN 5001               | Building Science and Engineering I                   | 3            |
| EMEN 5010               | Introduction to Engineering Management               | 3            |
| or EMEN 5020            | Finance for Engineering Managers                     |              |
| or CVEN 5006            | Construction Engineering and Management Fundamentals |              |
| AREN 5550               | Illumination 2                                       | 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 |
|------|-------|--------------|
|------|-------|--------------|

#### Required Courses

|              |   |   |
|--------------|---|---|
| AREN 5001    | Building Science and Engineering I                            | 3 |
| AREN 5002    | Building Science and Engineering II                           | 3 |
| EMEN 5010    | Introduction to Engineering Management                        | 3 |
| or EMEN 5020 | Finance for Engineering Managers                              |   |
| or CVEN 5006 | Construction Engineering and Management Fundamentals          |   |
| 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 |
|------|-------|--------------|
|------|-------|--------------|

#### 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 5835 | Special Topics for Seniors/Grads (Design of Masonry Structures or Design of Wood 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 |
|------|-------|--------------|
|------|-------|--------------|

#### Required Courses

|           |                                    |   |
|-----------|------------------------------------|---|
| AREN 5001 | Building Science and Engineering I | 3 |
|-----------|------------------------------------|---|

|           |  |   |
|-----------|--|---|
| CVEN 5006 | Construction Engineering and Management Fundamentals | 3 |
|-----------|--|---|

|           |   |   |
|-----------|---|---|
| CVEN 5836 | Special Topics for Seniors/Grads (BIM 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 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