

# MASTER OF SCIENCE IN ARCHITECTURAL ENGINEERING

The Master of Science in Architectural Engineering is a research and thesis-based graduate degree program oriented toward students who wish to develop more knowledge about the design, construction, and operation of buildings and their systems, including heating, ventilation, and air-conditioning (HVAC) systems, facades and enclosures, and electrical, lighting, fire protection, and plumbing systems. The degree program is intended for preparation for both engineering practice and research rooted in the principles of building science, indoor environmental quality, energy efficiency, and sustainability. Students are expected to conduct research at a rigorous level beyond the coursework-only Master of Engineering in Architectural Engineering degree program. The program also serves as a foundation for students who intend to pursue a doctoral degree.

Students with a variety of academic backgrounds are eligible to apply for the program, including those with undergraduate degrees in engineering disciplines (e.g., architectural, civil, mechanical, or environmental engineering) and non-engineering disciplines (e.g., architecture, construction management, or environmental design). All admitted students are expected to have passed thermodynamics and fluid mechanics in their undergraduate studies. If students have not passed these courses, they may be required to take proficiency courses in their first year of study or in the summer before their first year of study. Each applicant will be evaluated on a case-by-case basis during the application review process to determine any proficiency course requirements.

Students in the program must complete a minimum of 32 credit hours in total, with 6 to 8 hours of thesis credits (CAE 591) awarded for successful completion of master's thesis milestones. Up to 12 credit hours of 400-level undergraduate coursework may be included in the program with adviser approval.

## Curriculum

Degree candidates in the master of science program must complete a minimum of 32 credit hours, six to eight of which must be research and thesis credits. Up to 12 credit hours of 400-level undergraduate coursework may be included in the program with prior adviser approval. An oral defense of the thesis constitutes the comprehensive examination, and no additional written comprehensive examination is required.

## Curriculum

Code	Title	Credit Hours
<b>Required Courses</b>		<b>(6)</b>
CAE 513	Building Science <sup>1</sup>	3
CAE 526	Energy Conservation in Buildings <sup>2</sup>	3
or CAE 465	Energy Conservation in Buildings	
<b>Statistics/Data Analysis Requirement</b>		<b>(3)</b>
CAE 523	Statistical Analysis of Engineering Data	3
or MATH 474	Probability and Statistics	
or MATH 564	Regression	
or MMAE 500	Data Driven Modeling	
or BME 533	Biostatistics	
or STAT 514	Applied Computational Statistics for Analytics	
<b>Thesis Research</b>		<b>(6-8)</b>
CAE 591	Research and Thesis for M.S. Degree	6-8
<b>Architectural Engineering Elective Courses</b>		<b>(12)</b>
Select a minimum of 12 credit hours from the following:		12
CAE 461	Plumbing and Fire Protection Design	3
CAE 466	Building Electrical/Lighting Systems Design	3
CAE 467	Lighting Systems Design	3
CAE 505	Applications of Computational Fluid Dynamics in Engineering <sup>2</sup>	3
or CAE 405	Applications of Computational Fluid Dynamics in Engineering	
CAE 506	Building Envelope Rehabilitation	3
CAE 515	Building Energy Modeling	3
or CAE 474	Introduction to Building Information Modeling	
CAE 517	HVAC Systems Design <sup>2</sup>	3
or CAE 464	HVAC Systems Design	
CAE 519	Structural Forensic Engineering	3

CAE 524 or CAE 463	Building Enclosure Design <sup>2</sup> Building Enclosure Design	3
CAE 538 or CAE 438	Control of Building Environmental Systems <sup>2</sup> Control of Building Environmental Systems	3
CAE 550	Applied Building Energy Modeling	3
CAE 552 or CAE 462	Introduction to Sustainable Building Design Introduction to Sustainable Building Design	3
CAE 553	Measurement and Instrumentation in Architectural Engineering	3
CAE 554 or CAE 454	Building Commissioning <sup>2</sup> Building Commissioning	3
CAE 556	Net Zero Energy Building Design I	3
CAE 557	Net Zero Energy Building Design II	3
CAE 569 or CAE 470	Construction Methods, Cost Estimating, and Project Budgeting <sup>2</sup> Construction Methods and Cost Estimating	3
ENVE 503 or ENVE 403	Occupational and Environmental Health and Safety <sup>2</sup> Occupational and Environmental Health and Safety	3
ENVE 522 or ENVE 422	Global Environmental Change and Sustainability Analysis Global Environmental Change and Sustainability Analysis	3
ENVE 576	Indoor Air Pollution	3
MMAE 517	Computational Fluid Dynamics	3
<b>General Elective Courses</b>		<b>(3-5)</b>
Select up to five credit hours of general electives <sup>3</sup>		3-5

**Minimum degree credits required: 32**

- <sup>1</sup> Students who have previously passed an equivalent course in their prior degree programs may substitute another course for CAE 513 with adviser approval.
- <sup>2</sup> Up to 9-hours of 400-level courses can be applied to the program. For courses that are cross-listed with both graduate and undergraduate sections, students in the program should prioritize taking the graduate (500-level) section. Accelerated master's students can take either section that best fits their plan of study.
- <sup>3</sup> General electives can be taken in CAE, ENVE, ARCH, CHE, CHEM, EG, MMAE, SAM or other disciplines with advisor approval. If 6 hours of thesis credits (591) are taken, then a total of 5 hours of general elective coursework is required; if 8 hours of thesis credits (591) are taken, then a total of 3 hours of general elective coursework is required.