ARCHITECTURAL ENGINEERING, BACHELOR OF SCIENCE

The architectural engineering (BSAE) undergraduate program is a four-year program requiring 128 credit hours. A one-year master of architectural engineering (MAE) program of 30 credits is also offered. The MAE degree is accredited by ABET, and almost all of our BSAE graduates continue to complete the MAE degree.

Educational Objectives

The following are the BSAE/MAE program educational objectives (PEOs):

1. Professional Accomplishment: The AE program will prepare graduates to become licensed professional engineers a few years after graduation.
2. Career Accomplishment: The AE program will prepare graduates to contribute to society by working in an occupation related to the built environment a few years after graduation.

Architectural engineering (AE) is the engineering design of buildings. Students have the option to specialize in the design of one of the following:

1. Building structural systems
2. Building mechanical systems and acoustics
3. Building lighting and electrical systems

The first three years are common to all three fields of specialization and include the math and science courses common to all engineering programs. Students take an introductory course in AE in their first semester where they learn about the materials and systems that comprise a building, visit a construction site, and interact with their industry mentors. It provides a preview of the work they can expect to perform after graduation. This introductory course helps students decide if AE is the career path they wish to pursue.

In the third semester, the AE student begins the first of a three-course sequence of courses in AE Design and Simulation Studio. These courses familiarize the engineering student with building information technology (BIM), building systems, and how they support the design process of architects. The AE degree is keenly focused on integrating engineering concepts with architectural features to deliver aesthetic and high performing buildings. Exposure to construction is an important part of the AE student's education. It develops creativity and constructability where AE graduates enjoy a special ability to work effectively with all professionals on the design and construction team.

The AE program develops breadth and depth by requiring a good understanding of all the systems that comprise a building while also providing specialized education in one of the areas listed above. Breadth is provided in the fifth and sixth semesters, where all students take courses in each of the three areas of specialization. Depth is provided in the seventh and eighth semesters where courses are taken primarily in one of the three specialization tracks.

A one-year master of architectural engineering (MAE) degree follows the four-year undergraduate program. This fifth year continues the specialized education in each of the three option areas and provides the professional practice topics that architectural engineers need later in their careers.

The MAE year features a major interdisciplinary design project. The project requires students to practice the design skills and understanding of building systems previously developed. Student teams complete a significant building design in a manner that closely simulates professional practice. Industry and faculty members serve as consultants to the students.

Typically, students enter this design into the national Architectural Engineering Institute competition. Traditionally, our students do very well at this competition. Additionally, students complete an individual mastery project in a topic of their choice.

Career Opportunities

Architectural engineering graduates normally enter the building design industry and become registered professional engineers. There are only about 20 accredited architectural engineering programs in the country, so there is a large unfulfilled demand for engineers educated in building design. In Nebraska, the home of several large architectural and engineering design firms, this is especially true.

Architectural engineering is accredited by the EAC-ABET, Inc. The accreditation is attached to the one-year master of architectural engineering degree.

Major Department Admission

Students must complete at least 43 credit hours in the AE program before applying for professional admission to the degree program in AE. Transfer students must have all transfer hours accepted before applying for professional admission. Professional admission in the BSAE program requires a minimum of 2.8 GPA and allows students to continue to take 300-level AREN courses. The number of admitted students will depend on the availability of space, faculty, and other academic resources. Students are not permitted to register for more than 61 credit hours of courses listed in the AE curriculum until they have been professionally admitted into the degree program.

Learning Outcomes

Graduates of architectural engineering will develop:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The above student outcomes have been approved by the ABET Engineering Area Delegation for use beginning with the 2019-20 academic year, and have been adopted by the faculty of the Department of Architectural Engineering.

Additional Major Requirements

AREN 1000 DSAEC Seminar Requirement

Undergraduate Architectural Engineering majors are required to complete this zero-credit-hour course every semester they are in the major.

Grade Rules

C- and D grades

Architectural engineering students must earn a grade of C or better in math, science, computer programming, and engineering courses to obtain credit for that course toward graduation. Additionally, all courses that are

prerequisites for engineering courses must be passed with a grade of C or better.

Catalog to Use

Because of rapid technical developments, the AE curriculum is continually reviewed and upgraded. Students currently enrolled are expected to modify their programs to take advantage of such revisions. Students who do not maintain continuous progress toward the degree through enrollment in applicable coursework will be considered as new students upon re-entering the program and will be subject to the requirements of the undergraduate catalog current at the time of their re-entry.

ACE Requirements

The AE program follows the University of Nebraska–Lincoln Achievement Centered Education (ACE) requirements. Because of the specific needs of the program, most of these courses are specified in the curriculum.

Please contact DurhamSchool@unl.edu (durhamschool@unl.edu), if you are interested in more information about this program.

Requirements

Course	Title	Credits
First Semester		
AREN 1010	INTRODUCTION TO ARCHITECTURAL ENGINEERING	1
CMST 1110	PUBLIC SPEAKING FUNDS ENGR 100 is an accepted equivalent	3
MATH 1950	CALCULUS I	5
CHEM 1180	GENERAL CHEMISTRY I	3
CHEM 1184	GENERAL CHEMISTRY I LABORATORY	1
ACE ELECTIVE (SLO 9)		3
AREN 1000	DURHAM SCHOOL OF ARCHITECTURAL ENGINEERING AND CONSTRUCTION SEMINAR	0
ENGR 10	FRESHMAN ENGINEERING SEMINAR	0
	Credits	**16**
Second Semester		
MATH 1960	CALCULUS II	4
PHYS 2110	GENERAL PHYSICS I - CALCULUS LEVEL	4
PHYS 1154	GENERAL PHYSICS LABORATORY I	1
ACE ELECTIVE (SLO 5 OR 7)	ONE OF ACE 5 OR 7 MUST INCLUDE ART 3770 (7 ONLY) OR ART 3780 (5 ONLY)	3
CIST 1600	INTRODUCTION TO PROGRAMMING USING PRACTICAL SCRIPTING	3
AREN 1000	DURHAM SCHOOL OF ARCHITECTURAL ENGINEERING AND CONSTRUCTION SEMINAR	0
	Credits	**15**
Third Semeseter		
ECEN 211	ELEMENTS OF ELECTRICAL ENGINEERING	3
MATH 1970	CALCULUS III	4
PHYS 2120	GENERAL PHYSICS-CALCULUS LEVEL	4
PHYS 1164	GENERAL PHYSICS LABORATORY II	1
MECH 223	ENGINEERING STATICS	3
AREN 1030	DESIGN AND SIMULATION STUDIO I	3
AREN 1000	DURHAM SCHOOL OF ARCHITECTURAL ENGINEERING AND CONSTRUCTION SEMINAR	0
	Credits	**18**
Fourth Semester		
MECH 200	ENGINEERING THERMODYNAMICS	3
MATH 2350	DIFFERENTIAL EQUATIONS	3
MECH 325	MECHANICS OF ELASTIC BODIES	3
MECH 373	ENGINEERING DYNAMICS	3
AREN 3070	MECHANICS OF MATERIALS LAB	1
AREN 2030	DESIGN AND SIMULATION STUDIO II	3
AREN 1000	DURHAM SCHOOL OF ARCHITECTURAL ENGINEERING AND CONSTRUCTION SEMINAR	0
	Credits	**16**
Fifth Semester		
AREN 3200	LIGHTING I: FUND FOR DESIGN	3
AREN 3300	BUILDING ACOUSTICS FUNDAMENTALS	3
CONE 211	CONSTRUCTION BUSINESS METHODS	3
CIVE 310	FLUID MECHANICS	3
CIVE 310L	HYDRAULICS LAB	1
CIVE 341	STRUCTURAL ANALYSIS FUNDAMENTALS	3
CIVE 342	STRUCTURAL DESIGN FUNDAMENTALS	1
AREN 1000	DURHAM SCHOOL OF ARCHITECTURAL ENGINEERING AND CONSTRUCTION SEMINAR	0
	Credits	**17**
Sixth Semester		
AREN 3220	ELECTRICAL SYSTEMS FOR BUILDINGS I	3
AREN 3100	HVAC FUNDAMENTALS	3
CIVE 441	STEEL DESIGN I	3
AREN 4040	BUILDING ENVELOPES	3
STAT 3800	APPLIED ENGINEERING PROBABILITY AND STATISTICS	3
AREN 3030	AE DESIGN AND SIMULATION STUDIO III	3
AREN 1000	DURHAM SCHOOL OF ARCHITECTURAL ENGINEERING AND CONSTRUCTION SEMINAR	0
	Credits	**18**
Seventh Semester		
All options:		
TECHNICAL ELECTIVE	SELECT FROM PUBLISHED LIST ON DURHAM SCHOOL WEBSITE	3
CONE 206	ENGINEERING ECONOMICS	3
ENGL 3980	TECHNICAL WRITING ACROSS THE DISCIPLINES ENGR 220 is an accepted equivalent	3
AREN 1000	DURHAM SCHOOL OF ARCHITECTURAL ENGINEERING AND CONSTRUCTION SEMINAR	0
Select one of the following three options		9
Lighting and Electrical Option		
AREN 4200	LIGHTING II: THEORY, DESIGN & APPLICATION	
AREN 4120	BUILDING ENERGY II: PRIMARY AND SECONDARY SYSTEMS	
PSYC 1010	INTRODUCTION TO PSYCHOLOGY I (satisfies ACE SLO 6)	
Mechanical and Acoustics Option		
AREN 4120	BUILDING ENERGY II: PRIMARY AND SECONDARY SYSTEMS	

ACE ELECTIVE (SLO 6)		
GENERAL ELECTIVE	ELECTIVE MUST BE APPROVED BY ADVISOR	
Structural Option		
CIVE 440	REINFORCED CONCRETE DESIGN I	
CIVE 443	ADVANCED STRUCTURAL ANALYSIS	
ACE ELECTIVE (SLO 6)		
	Credits	**18**
Eighth Semester		
All options		
ACE ELECTIVE (SLO 5 OR 7)	ONE OF ACE 5 OR 7 MUST INCLUDE ART 3770 (7 ONLY) OR ART 3780 (5 ONLY)	3
AREN 1000	DURHAM SCHOOL OF ARCHITECTURAL ENGINEERING AND CONSTRUCTION SEMINAR	0
Select one of the following three options:		7
Lighting and Electrical Option		
AREN 4250	LIGHTING DESIGN	
PSYC 4210	SENSATION AND PERCEPTION	
Mechanical and Acoustics Option		
AREN 4150	HVAC DESIGN	
AREN 4300	ADVANCED NOISE CONTROL	
Structural Option		
CIVE 444	STRUCTURAL DESIGN AND PLANNING	
CIVE 331	INTRODUCTION TO GEOTECHNICAL ENGINEERING	
	Credits	**10**
	Total Credits	**128**