ARCHITECTURAL ENGINEERING (OMAHA)

Description

Website: http://engineering.unl.edu/durhamschool/architectural-engineering/

The architectural engineering (BSAE) undergraduate program is a four-year program requiring 130 credit hours. A one-year Master of Architectural Engineering (MAE) program of 36 credits is also offered. The MAE degree is accredited by ABET and almost all of our BSAE graduates continue to complete the MAE degree.

The educational objective of the program is to produce graduates who:

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 either the design of:

1. building structural systems;
2. building mechanical systems and acoustics; or
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 the students 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 the student to decide if AE is the career path he/she wishes to pursue.

In the second semester, the AE student begins the first of a four-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 esthetic and high performing buildings. Exposure to construction is an important part of 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 a 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 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 the student 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.

Career Opportunities

Architectural engineering graduates normally enter the building design industry and become registered professional engineers. There are 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. The students must have a minimum of 3.0 GPA over a pre-determined set of 43 credit hour freshman and sophomore level courses to be professionally admitted to the AE program and continue to take 300-level AE courses. A spreadsheet for calculation of AE professional admittance GPA is provided on the AE website. The number 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 accepted into the degree program in AE.

College Requirements

College Admission

College Entrance Requirements

Students must have high school credit for (one unit is equal to one high school year):

1. 4 units of mathematics: 2 of algebra, 1 of geometry, 1 of precalculus and trigonometry.
2. 4 units of English.
3. 3 units of natural science that must include 1 unit of physics and 1 unit of chemistry (chemistry requirement waived for students in construction management).
4. 2 units of a single foreign language.
5. 3 units of social studies.
6. Students having a composite ACT score of 28 or greater (or equivalent SAT score) will be admitted to the College of Engineering even if they lack any one of the following: trigonometry, chemistry, or physics.
7. Students having an ACT score of 19 or less in English (or equivalent SAT score) must take ENGL 150 Writing and Inquiry or ENGL 151 Writing and Argument.
A total of 16 units is required for admission.

Students must have an ACT (enhanced) score of 24 or greater (or equivalent SAT). Students who lack entrance requirements may be admitted based on ACT scores, high school rank and credits, or may be admitted to pre-engineering status in the Exploratory and Pre-Professional Advising Center. Pre-engineering students are advised within the College of Engineering.

Students for whom English is not their language of nurture must meet the minimum English proficiency requirements of the University.

Students who lack entrance units may complete precourse training by Independent Study through the UNL Office of On-line and Distance Education, in summer courses, or as a part of their first or second semester course loads while in the Exploratory and Pre-Professional Advising Center or other Colleges at UNL.

Students should consult their advisor, their department chair, or Engineering Student Services if they have questions on current policies.

### Other Admission Requirements

Students who transfer to the University of Nebraska–Lincoln from other accredited colleges or universities and wish to be admitted to the College of Engineering (COE) must meet COE freshman entrance requirements and have a minimum cumulative GPA of 2.5 for Nebraska residents or 3.0 for non-residents, and be calculus-ready. Students not meeting either of these requirements must enroll in the Explore Center or another UNL college until they meet COE admission requirements.

The COE accepts courses for transfer for which a C or better grade was received. Although UNL accepts D grades from the University of Nebraska at Kearney and at Omaha, not all majors in the COE accept such low grades. Students must conform to the requirements of their intended major and, in any case, are strongly encouraged to repeat courses with a grade of C- or less.

All transfer students must adopt the curricular requirements of the undergraduate catalog current at the time of transfer to the COE—not that in use when they entered UNL. Upon admission to UNL, students wishing to pursue degree programs in the COE will be classified and subject to the policies defined in the subsequent section.

### College Degree Requirements

#### Grade Rules

#### Grade Appeals

In the event of a dispute involving any college policies or grades, the student should appeal to his/her instructor, and appropriate department chair or school director (in that order). If a satisfactory solution is not achieved, the student may appeal his/her case through the College Academic Appeals Committee on his/her campus.

#### Catalog Rule

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted at UNL. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at UNL in the College of Engineering. Students must complete all degree requirements from a single catalog year. The catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

### Learning Outcomes

Majors in Architectural Engineering will be able to:

1. Practice architectural engineering as licensed professionals in the following application areas of building design: building structural systems, building mechanical systems, building acoustics, building lighting systems, and building electrical systems.
2. Apply the fundamental principles of science, engineering, and mathematics to the analysis of architectural engineering problems.
3. Design solutions to architectural engineering problems under realistic conditions that include: identifying relevant issues, formulating solutions, evaluating and selecting a solution, and communicating the final design.

### Major Requirements

All course numbers reflect the University of Nebraska at Omaha catalog system, as this program is only completed on the Omaha campus.

#### First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 1000</td>
<td>DSAEC Seminar</td>
<td>0</td>
</tr>
<tr>
<td>AE 1010</td>
<td>Introduction to Architectural Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CMST 1110</td>
<td>Public Speaking Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1950</td>
<td>Calculus I</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 1180</td>
<td>General Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 1184</td>
<td>General Chemistry I Lab</td>
<td>1</td>
</tr>
<tr>
<td>DSGN 1100</td>
<td>Design Thinking</td>
<td>3</td>
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</table>

Credit Hours Subtotal: 16

#### Second Semester

<table>
<thead>
<tr>
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<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>AE 1000</td>
<td>DSAEC Seminar</td>
<td>0</td>
</tr>
<tr>
<td>AE 2250</td>
<td>Construction Graphics &amp; Design Process</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1960</td>
<td>Calculus II</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 2110</td>
<td>General Physics 1-Calculus Level</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 1154</td>
<td>General Physics Lab I</td>
<td>1</td>
</tr>
<tr>
<td>DSGN 1110</td>
<td>Design Making</td>
<td>4</td>
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Credit Hours Subtotal: 17

#### Third Semester

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<tbody>
<tr>
<td>AE 1000</td>
<td>DSAEC Seminar</td>
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<tr>
<td>MENG 2000</td>
<td>Engineering Thermodynamics</td>
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<tr>
<td>CIST 1400</td>
<td>Introduction to Computer Programming</td>
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</tr>
<tr>
<td>MATH 1970</td>
<td>Calculus III</td>
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<tr>
<td>PHYS 2120</td>
<td>General Physics–Calculus Level</td>
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</tr>
<tr>
<td>PHYS 1164</td>
<td>General Physics Lab II</td>
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</tr>
<tr>
<td>MENG 2230</td>
<td>Engineering Statics</td>
<td>3</td>
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Credit Hours Subtotal: 18

#### Fourth Semester

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<tr>
<td>AE 1000</td>
<td>DSAEC Seminar</td>
<td>0</td>
</tr>
<tr>
<td>ECEN 2110</td>
<td>Elements of Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>AE 2400</td>
<td>Building Systems</td>
<td>3</td>
</tr>
<tr>
<td>MENG 3730</td>
<td>Engineering Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2350</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>AE 3070</td>
<td>Mechanics of Materials Lab</td>
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</tr>
<tr>
<td>MENG 3250</td>
<td>Mechanics of Elastic Bodies</td>
<td>3</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 16

#### Fifth Semester

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<tr>
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<td>Elements of Electrical Engineering</td>
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<td>MENG 3250</td>
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</table>

Credit Hours Subtotal: 16
AE 1000  DSAEC Seminar  0
AE 3200  Lighting I: Fundamentals for Design  3
AE 3300  Building Acoustics Fundamentals  3
CIVE 310/MENG 3100  Fluid Mechanics  3
CIVE 319  Hydraulics Laboratory  1
CIVE 341  Introduction to Structural Engineering  4
ENGL 3980  Technical Writing Across the Disciplines  (ENGR 3000 is an accepted equivalent for ENGL 3980)  3

Credit Hours Subtotal:  17

Sixth Semester
AE 1000  DSAEC Seminar  0
AE 3220  Electrical Systems for Buildings I  3
AE 3100  HVAC Fundamentals  3
CIVE 441  Steel Design I  3
MENG 4200/ MENG 8206  Heat Transfer  3
STAT 3800/STAT 8805  Applied Engineering Probability & Statistics  3
ACE Elective (From ACE SLO 9)  3

Credit Hours Subtotal:  18

Seventh Semester
AE 1000  DSAEC Seminar  0
All Options
ART 3770  History of Architecture to 1850  (Satisfies ACE SLO 5)  (AE 3770 is an accepted substitute for ART 3770 and satisfies ACE SLO 5)  3
CONE 2060  Engineering Economics  3
CIVE 440  Reinforced Concrete Design I  3
Select one of the following options:  9
Lighting and Electrical Options
AE 4200/AE 8206  Lighting II: Theory, Design & Application
AE 4120  Building Energy II: Primary & Secondary Systems
PSYC 1010  Introduction to Psychology I  (Satisfies ACE SLO 6)
Mechanical and Acoustics Options
AE 4120  Building Energy II: Primary & Secondary Systems
ACE Elective (From ACE SLO 6)
General Elective (Should be approved by your advisor)
Structural Option
CIVE 443  Advanced Structural Analysis
ACE Elective (From ACE SLO 6)
General Electives (Should be approved by your advisor)

Credit Hours Subtotal:  18

Eighth Semester
AE 1000  DSAEC Seminar  0
All Options
ART 3780  History of Architecture Since 1850  (Satisfies ACE SLO 7)  3

Select one of the following options:  7
Lighting and Electrical Option
AE 4250  Lighting Design
PSYC 4210  Sensation & Perception
Mechanical and Acoustics Option
AE 4150  HVAC Design
AE 4300/AE 8306  Advanced Noise Control
Structural Option
CIVE 334  Introduction to Geotechnical Engineering
CIVE 444  Structural Design and Planning

Credit Hours Subtotal:  10
Total Credit Hours  130

Additional Major Requirements
Because of rapid technical developments, the AE curriculum is continually reviewed and upgraded. Currently enrolled students 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 course work 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.

AE students must pass any course offered by the AE program (those with an AE or CIVE prefix) with a grade of “C-” or higher to obtain credit toward graduation for that course. All courses that are prerequisites for AE or CE courses must be passed with a grade of “C-” or higher to obtain entry into the subsequent course.

The AE program follows the UNL ACE general education requirements. Because of the specific needs of the program, most of these courses are specified in the curriculum.

Please contact Melissa Hoffman at melissa.hoffman@unl.edu or 402-554-4482, if you are interested in more information about this program.

Career Information
The following represents a sample of the internships, jobs and graduate school programs that current students and recent graduates have reported.

Jobs of Recent Graduates
• Electrical Engineer, SmithGroupJJR - Chicago IL
• Structural Engineer in Training, Leo A Daly - Omaha NE
• Mechanical Engineer, HDR Architecture - Dallas TX
• Lighting Designer/Engineer, HGA - Minneapolis MN
• Acoustics and Technology Specialist, Henderson Engineers - Lenexa KS
• Entry-Level Electrical Engineer, Affiliated Engineers, Inc. - Madison WI
• Mechanical Engineer-in-Training, Leo A. Daly - Omaha NE
• Energy Analyst, Energy Studio Inc - Omaha NE
• Technology Engineer, BG Buildingworks - Avon CO
• Structural Engineer, Black & Veatch - Overland Park KS

Internships
• Structural Engineering Intern, Olsson Associates - Omaha NE
Architectural Engineering (Omaha)

• Lighting Design Intern, HGA Architects and Engineers - Minneapolis MN
• Mechanical Engineering Intern, EYP - Maitland FL
• Acoustical Intern, Threshold Acoustics - Chicago IL
• Electrical Engineer Intern, HDR, Inc. - Dallas TX
• Commissioning Intern, LEO A. DALY - Omaha NE
• Mechanical Engineering Intern, Specialized Engineering Solutions, Inc. - Omaha NE
• Electrical Engineering Intern, HDR - Omaha NE
• Acoustics Intern, Alvine Engineering - Omaha NE
• Structural Intern, BSE Structural Engineers - Lenexa KS

Grad Schools
• Masters of Architectural Engineering, University of Nebraska-Lincoln - Omaha NE
• Ph.D. in Architectural Engineering, University of Nebraska-Lincoln - Omaha NE
• Ph.D. Electrical Engineering, University of Texas at Austin - Austin TX