Architectural Engineering (BSArchE)

Buildings are the domain of architectural engineers and endpoints of this important engineering discipline. Americans spend over 70 total years of an average lifetime inside of buildings. As such, an important role of architectural engineers is to design buildings that are structurally resilient and able to withstand the loads that act on their exterior and interior surfaces. Because of the amount of time people spend in them, it is also important that buildings be designed, constructed, operated, and maintained to be healthy environments, free of airborne or surface contamination that can adversely affect occupants. Furthermore, buildings should also be comfortable environments that facilitate worker productivity and learning. In the United States, buildings account for nearly 40% of all energy use, over 70% of electricity use, and are major contributors to greenhouse gas emissions. As such, architectural engineers strive to design, construct, and operate both energy efficient and healthy buildings, with an increasing focus on the use of appropriate green building materials and products.

The building sector represents a major fraction of the United States economy, and buildings are by far the number one asset amongst all assets in the United States. Their appropriate design is critical for the people they serve, national and global economies, and for reasons of environmental sustainability. The curriculum in architectural engineering is designed to meet these needs. It offers training in the fundamentals of engineering, with specialization in structural analysis and design, building energy and environments, building construction, and materials. This curriculum affords the student the opportunity to attain competence in the structural design of resilient buildings, from high-rise office buildings to single-family homes, and from hospitals to schools. Courses in building energy and environments provide graduates with knowledge relevant to the design and operation of both energy efficient and healthy buildings. Students will also gain important knowledge related to sustainable construction practices, construction management, and modern building materials.

The extensive technical requirements, coupled with courses in arts and sciences, provide the architectural engineering student with an opportunity to obtain a background that is ideally suited for careers and positions of responsibility with consulting engineering firms, general contractors, manufacturers, government agencies, and architecture firms. The curriculum also serves as an excellent springboard to graduate study in the areas of structural engineering, building energy and environments, construction engineering and project management, or infrastructure materials engineering.

Objectives

Graduates of the architectural engineering program should solve architectural engineering problems within a greater societal context. They should:

- Exhibit character and decision-making skills embodying professionalism and ethical behavior
- Apply knowledge, strong reasoning, and quantitative skills to design and implement creative and sustainable solutions
- Engage in lifelong learning to meet evolving engineering challenges facing society
- Exhibit strong communication, critical thinking, interpersonal, and management skills as leaders and contributors in the architectural engineering profession

Graduates of the architectural engineering program are expected to have

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- 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
- An ability to communicate effectively with a range of audiences
- 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
- 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
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Total Hours Required: 126

Plan of Study

The Plan of Study is a suggested four-year course sequence to support academic planning and serves as a helpful guide. Currently enrolled students should meet with their academic advisor to tailor their course selections and timelines to their individual goals and circumstances.

Course	Title	Hours
Year 1		
Semester 1		
ARE 102	Introduction to Architectural Engineering	1
CH 301	Principles of Chemistry I	3
M 408C	Differential and Integral Calculus	4
RHE 306	Rhetoric and Writing	3
First-Year Signature Course (090)		3
	Hours	**14**
Semester 2		
Hours chosen from: Approved architectural history		3
GEO 303	Introduction to Geology	3
M 408D	Sequences, Series, and Multivariable Calculus	4
PHY 303K	Engineering Physics I	3
PHY 105M	Laboratory For Physics 302K, 303K, and 317K	1
Social and Behavioral Sciences (080)		3
	Hours	**17**
Year 2		
Semester 1		
C E 311K	Introduction to Computer Methods	3
E M 306	Statics	3
M 427J	Differential Equations with Linear Algebra	4
PHY 303L	Engineering Physics II	3
PHY 105N	Laboratory For Physics 302L, 303L, and 317L	1
U.S. History (060)		3
	Hours	**17**
Semester 2		
ARE 217	Computer-Aided Design and Graphics	2
C E 311S	Probability and Statistics for Civil Engineers	3
E M 319	Mechanics of Solids	3
C E 319F	Elementary Mechanics of Fluids	3
E S 333T	Engineering Communication	3

U.S. History (060)		3
	Hours	**17**
Year 3		
Semester 1		
ARE 320K	Introduction to Design I	3
C E 324P	Properties and Behavior of Engineering Materials	3
C E 329	Structural Analysis	3
C E 357	Geotechnical Engineering	3
M E 310T	Applied Thermodynamics	3
	Hours	**15**
Semester 2		
ARE 320L	Introduction to Design II	3
ARE 335	Materials and Methods of Building Construction	3
ARE 346N	Building Environmental Systems	3
C E 331 or C E 335	Reinforced Concrete Design or Elements of Steel Design	3
Humanities (040)		3
	Hours	**15**
Year 4		
Semester 1		
ARE 323K	Project Management and Economics	3
ARE 346P or ARE 371	HVAC Design or Energy Simulation in Building Design	3
Hours chosen from: Approved Math/science		3
Hours chosen from: Approved technical electives		3
American and Texas Government (070)		3
	Hours	**15**
Semester 2		
ARE 465	Integrated Design Project	4
ARE 366	Contracts, Liability, and Ethics	3
American and Texas Government (070)		3
Hours chosen from: Approved technical electives		6
	Hours	**16**
	Total Hours	**126**

Requirements

All requirements are listed below, starting with the most specialized moving to the most general. Additional requirements may follow the table, so be sure to read the entire page. Some required courses listed below may also satisfy General Education requirements, including Core Curriculum.

Code	Title	Hours
Architectural Engineering Courses		
ARE 102	Introduction to Architectural Engineering	1
ARE 217	Computer-Aided Design and Graphics	2
ARE 320K	Introduction to Design I	3
ARE 320L	Introduction to Design II	3
ARE 323K	Project Management and Economics	3
ARE 335	Materials and Methods of Building Construction	3
ARE 346N	Building Environmental Systems	3
ARE 346P	HVAC Design	3
or ARE 371	Energy Simulation in Building Design	
ARE 366	Contracts, Liability, and Ethics	3
ARE 465	Integrated Design Project	4
Civil Engineering		
C E 311K	Introduction to Computer Methods	3
C E 311S	Probability and Statistics for Civil Engineers	3
C E 319F	Elementary Mechanics of Fluids	3
C E 324P	Properties and Behavior of Engineering Materials	3
C E 329	Structural Analysis	3
C E 331	Reinforced Concrete Design	3
or C E 335	Elements of Steel Design	
C E 357	Geotechnical Engineering	3
Chemistry		
CH 301	Principles of Chemistry I	3
Engineering Mechanics		
E M 306	Statics	3
E M 319	Mechanics of Solids	3
Mathematics		
M 408C	Differential and Integral Calculus	4
M 408D	Sequences, Series, and Multivariable Calculus	4
M 427J	Differential Equations with Linear Algebra	4
Physics		
PHY 105M	Laboratory For Physics 302K, 303K, and 317K	1
PHY 105N	Laboratory For Physics 302L, 303L, and 317L	1
PHY 303K	Engineering Physics I	3
PHY 303L	Engineering Physics II	3
Additional Coursework		
E S 333T	Engineering Communication	3
GEO 303	Introduction to Geology	3
M E 310T	Applied Thermodynamics	3
Approved architectural history elective		3
Approved mathematics or science elective		3
Technical Electives		9
Subtotal		*102*
General Education		
Remaining Core Curriculum (42 hours total)		24
Foreign Language other than English, Beginning Proficiency		
Subtotal		*24*
College Requirements - Engineering		
General University Requirements		
Total Hours		**126**

Additional Requirements and Policy

Portable Computing Devices

Student entering Architectural Engineering are required to have a laptop at their disposal. Laptops do not need to be brought to campus daily, but individual courses may require that a laptop be brought to class or lab sessions. For more information, see the list of minimum system requirements.

Technical Electives

The course lists tab reflects current course offerings and are subject to change by the faculty. Current lists are available in the departmental undergraduate office.

Course List

Building Energy and Environments

Code	Title	Hours
ARE 346P	HVAC Design	
or ARE 371	Energy Simulation in Building Design	
ARE 370	Design of Energy Efficient and Healthy Buildings	
C E 341	Introduction to Environmental Engineering	
C E 370L	Climate Change Mitigation	
M E 339	Heat Transfer	

M E 374F	Fire Science
M E 374S	Solar Energy Systems Design
M E 379N	Engineering Acoustics

Construction and Infrastructure Materials Engineering

Code	Title	Hours
ARE 358	Cost Estimating in Building Construction	
ARE 376	Building Information Modeling for Capital Projects	
C E 351	Concrete Materials	
M E 349	Corrosion Engineering	
M E 378K	Mechanical Behavior of Materials	
M E 378P	Properties and Applications of Polymers	

Structural Engineering

Code	Title	Hours
ARE 345K	Masonry Engineering	
ARE 362L	Structural Design in Wood	
C E 331	Reinforced Concrete Design	
or C E 335	Elements of Steel Design	
C E 360K	Foundation Engineering	
C E 362M	Advanced Reinforced Concrete Design	
C E 362N	Advanced Steel Design	
C E 363	Advanced Structural Analysis	
C E 375	Earth Slopes and Retaining Structures	
E M 339	Advanced Strength of Materials	