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## WHAT IS ARCHITECTURAL ENGINEERING?

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### **What is Architectural Engineering?**

*“Architectural Engineering is the discipline concerned with the planning, design, construction, and operation of engineered systems for commercial, industrial, and institutional facilities.*

*Engineered systems include electric power, communications and control; lighting; heating, ventilation, and air conditioning; and structural systems.*

*An Architectural Engineer works closely with those in all areas of the building process to design and possibly to construct the engineered systems that make buildings come to life for their inhabitants.”<sup>1</sup>*

### **How is AE different from Architecture?**

Architectural engineers are not architects! We work closely with architects – we need them and they need us – but these are two distinct fields. You need an engineering degree to be licensed as an architectural engineer and an architecture degree to become licensed as an architect. Both are needed to build a building.

Architects work with people who want a building and they give that building a form. They are part psychologist – figuring out what clients really want and need even when it may be difficult for them to explain, or when there might be options that a client might not know about. They are part artist – the glass atrium of the Peter Kiewit Institute and the First National Tower’s impact on Omaha’s new ‘skyline’ are the inspirations of architects. Omaha architects, actually. You’ll experience this artistic nature when you take architecture classes. They also have to do some very practical things – like making sure that every room is close enough to a fire exit and every restroom fixture and placard comply with the Americans with Disabilities Act. Sometimes they even get to go out onto a job site and yell at a contractor for a while.

Architectural engineers collaborate with architects to design buildings. It’s OK for Architectural engineers to be less artistic, but you need to be able to see and understand the vision, and to work to support that. You need to have some basic “visual literacy” because the building design process is highly visual and calls for neat, quick sketches and detailed computer drawings that leave no room for interpretive error. But if your studio projects next year aren’t award winning watercolor paintings, it’s OK...Just focus your energy on developing neat handwriting. Architectural engineers take the Architect’s vision and they make it happen. In the case of the skyscraper, engineers were needed to determine the highest wind force that building will experience and to design beams and columns that will withstand it. For that glass atrium, I guarantee you there were engineers running heating and cooling calculations who were saying, “Here’s what kind of glass you need to use if your owner doesn’t want to go broke paying the air conditioning bills”. One way to sum up what engineers do is to say that we think of everything that could go wrong and try to plan for it. Our goals are to find a safe, healthy, economical, durable, energy conserving solution to the architect’s design.

### **How are Civil, Mechanical, and Electrical Engineering different from Architectural Engineering?**

This is a much greyer area. Architectural engineers typically focus on one of the specialty areas below: structural, HVAC (Heating, Ventilating and Air Conditioning – basically an umbrella for anything mechanical), acoustics, electrical, lighting, or construction management. Not every school has every one of these specializations, and sometimes two of them may be lumped together (for instance, lighting and electrical) – but these are the possibilities. For each of these possibilities, there is another parallel discipline that you could also major in, graduate, and get the same job. Below, I will discuss the differences and some factors that you might consider in making your choice.

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<sup>1</sup> Source: Architectural Engineering Institute (AEI) web site [www.aeoinstitute.org](http://www.aeoinstitute.org)

The parallel discipline for the structural option area is usually civil engineering. Students in both of these disciplines take many of the same structural classes, but the other “broad background” classes that they take are different. Civil engineers will take some courses in transportation and environmental engineering, while Architectural engineers will study architecture, lighting, and HVAC systems. AE programs try to differentiate themselves from civil/structural programs by producing graduates who have more skills and vocabulary targeted toward integrating with other members of the project team. In fact, I know structural engineers with AE degrees who have been able to wait out sluggish job markets by working as facility managers, or even doing design in one of the other option areas. If you know that you want to work in the building industry after you graduate, these can be major advantages. On the other hand, it is sometimes possible (though not usually required) to take more classes that focus on structures in a civil curriculum.

Likewise, many people major in mechanical or electrical engineering and take jobs in building HVAC or electrical design after graduation. However, mechanical and electrical engineering programs don’t offer very many courses that are relevant to building systems design. Traditional mechanical engineering curricula offer one or possibly two courses in HVAC design, and no courses in the other building areas. In electrical engineering, there may be even fewer offerings. These students also miss the “broad background” courses in architecture, structures, and other building disciplines. The building design industry recognizes a strong need for students who have more building-specific training, and this translates into marketability for AE graduates when they are looking for a job. If you know you want to work in the building industry, an AE degree offers a significant edge for students in these areas.

For other focus areas, like lighting and acoustics, parallel programs that offer a lot of focused courses may simply be difficult to find. Lighting design professionals have come from a variety of backgrounds including interior design, architecture, theater, and AE lighting programs. Having an engineering degree (which makes you available for engineering licensure) and the additional background in electrical systems can be valuable in some work situations. There are also a few stand-alone acoustics programs, and some that are a part of mechanical or civil engineering, but these are rare. Since HVAC systems are a major source of noise in buildings, the background that AE students receive in this area can be really valuable if you want to work in the building industry.

Some architectural engineering programs also offer a specialization in construction, though the Nebraska program does not. Many construction professionals come from construction management, construction engineering, or construction technology programs. One distinction for students in engineering programs is that they will be eligible for engineering licensure. There are other certifications for construction professionals, and engineering licensure isn’t required for most jobs. However, in some situations or in the future it could be an advantage. Because they study all the areas of building design, AE graduates can move into construction if they choose to. This most commonly occurs in companies that use the “design-build” process, in which the building design and construction are tightly integrated. In that process, the AE’s training in design can be really valuable. Generally, however, if you know that construction is what you want to do, a construction-focused program might be a better fit.

### **So, what kind of jobs do graduates have?**

Most AE graduates go to firms that do structural, HVAC, and electrical design. They may also work for smaller specialty firms that focus on lighting or acoustical consulting. Some work as facilities managers for large companies that own a lot of buildings. Another option is to work for a manufacturer, either in the design of building system components or in sales. Construction management is another possibility.