ARCHITECTURAL ENGINEERING (AE)

AE 1000 DURHAM SCHOOL OF ARCHITECTURAL ENGINEERING AND CONSTRUCTION SEMINAR (0 credits)
Presentation of professional problems and practices by students, faculty, and professionals associated with careers in the Durham School of Architectural Engineering and Construction

AE 1010 INTRODUCTION TO ARCHITECTURAL ENGINEERING (1 credit)

AE 1020 SUSTAINABLE BUILDINGS (3 credits)
Introduction to building systems. Sustainable design and construction. The United States Green Building Council's rating system. Sustainable building sites, water efficiency, energy performance, building commissioning, building and/or material reuse, sustainable materials, indoor environmental quality, and innovation in sustainable design and construction.
Prerequisite(s)/Corequisite(s): Not open to nondegree students

AE 2010 ARCHITECTURAL ENGINEERING SEMINAR (1 credit)
This course will inform students about careers in Architectural Engineering and about non-technical issues of engineering practice. It will include visits to offices and job sites, and talks by practicing professionals. Professional, ethical, social, and environmental issues will be addressed. Students will gain experience in teamwork, and in presentation of information.
Prerequisite(s)/Corequisite(s): AE 1010 and 30 credit hours completed

AE 2110 THERMODYNAMICS FOR ARCHITECTURAL ENGINEERING (3 credits)
First and Second Laws of Thermodynamics, properties of gases and vapors. Sources of energy and its conversion to work. Applications on Architectural Engineering and Construction.
Prerequisite(s)/Corequisite(s): MATH 1960, PHYS 2110. Not open to nondegree graduate students

AE 2250 CONSTRUCTION GRAPHICS AND DESIGN PROCESS (3 credits)
Introduction to typical computer-graphics and calculation applications used in a contemporary architectural engineering design office. Extensive use of CAD and electronic spreadsheet software to solve typical analysis and design problems. Fundamentals of descriptive geometry and two and three-dimensional drawing systems. Use of drawing conventions common to construction design. Basics of personal computer applications. Conceptual review of engineering design and technical problem solving processes.

AE 2400 BUILDING SYSTEMS (3 credits)
Building systems as integral elements in architecture; building assemblies and materials; building system relationships; communication of ideas between design professionals, clients, contractors and manufacturers; construction drawings and specifications.
Prerequisite(s)/Corequisite(s): AE 2250

AE 3070 MECHANICS OF MATERIALS LAB (1 credit)
Introduction to the behavior and testing of various building materials. The concepts of axial stress and strain, flexural stress and strain, beam deflections and column buckling.
Prerequisite(s)/Corequisite(s): Coreq: MENG 3250 or EMEC 3250.

AE 3100 HVAC FUNDAMENTALS (3 credits)
Topics will include an introduction to the types of air conditioning systems; the properties of moist air, psychrometric processes in HVAC equipment; indoor air quality; thermal comfort; heat transmission in buildings; solar radiation; and the calculation of building infiltration rates, space heating loads and space cooling loads.
Prerequisite(s)/Corequisite(s): MENG 2000; Co-Req.: MENG 4200.

AE 3120 MECHANICAL SYSTEMS FOR BUILDINGS (3 credits)
Fluid flow, pumps, and piping design; space air diffusion; fans, ducts, and building air distribution; refrigeration equipment.
Prerequisite(s)/Corequisite(s): CIVE310 and CIVE319 and AE 3100

AE 3130 HVAC LAB (1 credit)
Conduct experiments and prepare written reports involving fluid flow, pumps, fans, ducts, piping; basic heat transfer and thermodynamic principles.
Prerequisite(s)/Corequisite(s): CIVE310 and CIVE319 and AE 3100

AE 3200 LIGHTING I: FUND FOR DESIGN (3 credits)
General introduction to illumination engineering for building interiors. Topics include the fundamentals of light and vision, lighting equipment, requirements for building lighting, and basic illuminating engineering design methods.
Prerequisite(s)/Corequisite(s): AE 2250 and CIST1400

AE 3220 ELECTRICAL SYSTEMS FOR BUILDINGS I (3 credits)
General introduction to the design of electrical power systems as they apply to buildings. Topics include electrical systems, and the basic engineering design methods.
Prerequisite(s)/Corequisite(s): AE 2250 and ELEC2110

AE 3230 LIGHTING AND ELECTRICAL SYSTEMS LAB (1 credit)
General introduction to lighting and electrical systems in building interiors, through hands-on exercises using a range of currently available lighting and electrical technologies. Topics include: principles of object modeling, lamp and luminaire workshops, field measurements of lighting and electrical systems, motor workshop, power consumption and power factor workshops.
Prerequisite(s)/Corequisite(s): AE 3200 and coreq AE 3220

AE 3300 BUILDING ACOUSTICS FUNDAMENTALS (3 credits)
An introduction to the acoustics of buildings. Topics include the fundamentals of sound generation, propagation, and measurement; human hearing; acoustic properties of materials and constructions; basic room acoustics; and noise control.
Prerequisite(s)/Corequisite(s): PHYS2120

AE 3770 GLOBAL EXPERIENCES IN ARCHITECTURAL ENGINEERING (1-3 credits)
Individual or group educational experience in Architectural Engineering that combine classrooms, lectures, discussions, and/or seminars with field and/or classroom studies in a foreign country. Choice of subject matter and coordination of on- and off-campus activities are at the discretion of the instructor.

AE 3920 INDIVIDUAL INSTRUCTION IN ARCHITECTURAL ENGINEERING III (1-3 credits)
Individual instruction in Architectural Engineering at the junior level in a selected area, under the supervision and guidance of an Architectural Engineering faculty member.

AE 3940 SPECIAL TOPICS IN ARCHITECTURAL ENGINEERING III (3 credits)
Special topics in Architectural Engineering at the junior level that are not yet covered in other courses in the Architectural Engineering curriculum.
Prerequisite(s)/Corequisite(s): Permission of instructor.

AE 4020 ARCHITECTURAL ENGINEERING SENIOR DESIGN PROJECT IN LIGHTING (4 credits)
Senior design project that integrates lighting design and illuminating engineering through a semester long design problem. A self-directed execution of the lighting design process culminating with a professional design solution.
Prerequisite(s)/Corequisite(s): AE 3220 and AE 4200

AE 4120 BUILDING ENERGY II: PRIMARY AND SECONDARY SYSTEMS (3 credits)
Analysis and design of building air distribution systems, fans, pumps, piping, space air diffusion and heat exchangers.
Prerequisite(s)/Corequisite(s): CIVE3100 and MENG4200 and AE 3100
AE 4150 HVAC DESIGN (4 credits)
Develop and design the mechanical system for an actual building, from the programming phase to the final construction documents. (Is the first option-specific mechanical systems design course and is to be taken during the forth year of B.S.A.E. program.)
Prerequisite(s)/Corequisite(s): AE 4120, not open to nondegree students

AE 4200 LIGHTING II: THEORY, DESIGN & APPLICATION (3 credits)
Design and analysis of lighting systems; emphasis is on the integration between the lighting design process and the technical foundations for building lighting; topics include design criteria; lighting design procedures, lighting modes and subjective effects; calculation tools. Lab sessions include photometric measurements and computer applications. (Cross-listed with AE 8206)
Prerequisite(s)/Corequisite(s): AE 3200

AE 4250 LIGHTING DESIGN (4 credits)
Advanced design and analysis of lighting systems. Application of the lighting design process for advanced interior applications such as multimedia facilities, and outdoor applications such as sports lighting. (Requires the initiation of the design process, proceeding in a self-directed manner through intermediate steps, and producing professional lighting design solutions.)
Prerequisite(s)/Corequisite(s): AE 4200, not open to nondegree students

AE 4300 ADVANCED NOISE CONTROL (3 credits)
Characterization of acoustic sources; use and measurement of sound and intensity; sound-structure interaction; acoustic enclosures and barriers; muffling devices; vibration control; and active noise control. (Cross-listed with AE 8306)
Prerequisite(s)/Corequisite(s): AE 3300

AE 4920 INDIVIDUAL INSTRUCTION IN ARCHITECTURAL ENGINEERING IV (1-3 credits)
Individual instruction in Architectural Engineering at the senior level in a selected area, under the supervision and guidance of an Architectural Engineering faculty member.

AE 4940 SPECIAL TOPICS IN ARCHITECTURAL ENGINEERING IV (3 credits)
Special topics in Architectural Engineering at the senior level that are not yet covered in other courses in the Architectural Engineering curriculum.
Prerequisite(s)/Corequisite(s): Permission of instructor.