

ARCHITECTURAL ENGINEERING (AREN)

AREN 100 Durham School of Architectural Engineering and Construction Seminar

Notes: This course can be taken multiple times.

Description: Presentation of professional problems and practices by students, faculty, and professionals associated with careers in the Durham School of Architectural Engineering and Construction.

Credit Hours: 0

Max credits per semester:

Max credits per degree:

Format: LEC

AREN 101 INTRO ARCH ENGINERNG

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LEC

AREN 103 Design and Simulation Studio I

Description: Focus on virtual modeling in the context of conceptual design. Study of fundamentals of Building Information Modeling (BIM), iterative design processes, early design analysis techniques, and technical problem-solving processes. Development of modeling skills in various software programs including Autodesk Revit, Formit, Dynamo, and Trimble Sketchup.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Prerequisite for: AREN 203

AREN 201 ARCH ENGINEERNG SMNR

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LEC

AREN 203 Design and Simulation Studio II

Prerequisites: AREN 103 Design and Simulation Studio I

Description: Focus on building systems as integral elements in architecture, building and construction assemblies, materials and methods, fabrication, and tectonic exploration using building information modeling (BIM) processes. Exposure to building construction systems, stereotomic and tectonic construction assemblies, and fundamentals of the architectural design process.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 211 Thermodynamics for Architectural Engineering

Prerequisites: MATH 1960 (Calculus II) or equivalent; PHYS 2110 (General Physics) or equivalent.

Description: 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.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 225 CNST GRAPHICS & DSGN

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 240 BUILDING SYSTEMS

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 307 MECH OF MTRLS LAB

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LAB

AREN 310 HVAC Fundamentals

Prerequisites: MENG 2000 (Thermodynamics) or equivalent; this course is co-requisite with MENG 4200 (Heat Transfer).

Description: Topics will include an introduction to the types of air conditioning systems; the properties of moist air, psychometric 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.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Prerequisite for: AREN 412

AREN 312 MECH SYSTM FOR BLDGS

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 313 HVAC LABORATORY

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LAB

AREN 320 LIGHTING I: FUND DESIGN

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 322 ELECTRICAL SYSTEMS I

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 323 LIGHTNG&ELEC SYS LAB

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LAB

AREN 330 BUILDING ACOUSTICS

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 377 Global Experiences in Architectural Engineering

Prerequisites: Department permission.

Description: 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.

Credit Hours: 1-3

Min credits per semester: 1

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

ACE: ACE 5 Humanities

AREN 392 INDIVIDL INSTRTN III

Credit Hours: 1-3

Min credits per semester: 1

Max credits per semester: 3

Max credits per degree: 3

Format: IND

AREN 394 SPECIAL TOPICS III

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 401 SR PROJECT: MECH SYS

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

AREN 402 SR PROJECT: LIGHTING

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

AREN 412 Building Energy II: Primary and Secondary Systems

Prerequisites: CIVE/MECH 310/(UNO)CIVE 3100; MECH 420/820/(UNO) MENG 4200; (UNO) and AE 3100.

Description: Analysis and design of building air distribution systems, fans, pumps, piping, space air diffusion, chillers, and boilers.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Prerequisite for: AREN 415

AREN 415 HVAC Design

Prerequisites: AREN 412/AE 4120.

Description: Develop and design the mechanical system for an actual building, from the programming phase to the final construction documents.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

ACE: ACE 10 Integrated Product

AREN 420 Lighting II: Theory, Design and Application

Crosslisted with: AREN 820

Prerequisites: (UNO) AE 3200

Notes: Lab sessions include photometric measurements and computer applications.

Description: Design and analysis of lighting systems; the integration between the lighting design process and the technical foundations for building lighting; design criteria; lighting design procedures lighting modes and subjective effects; and calculation tools.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Prerequisite for: AREN 425; AREN 823; AREN 825; AREN 920

AREN 425 Lighting Design

Prerequisites: AREN 420/(UNO) AE 4200.

Description: 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.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

ACE: ACE 10 Integrated Product

AREN 430 ADV NOISE CONTROL

Crosslisted with: AREN 830

Prerequisites: AE 3300 or equivalent

Description: Characterization of acoustic sources; use and measurement of sound power and intensity; sound-structure interaction; acoustic enclosures and barriers; muffling devices; vibration control; and active noise control.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 462 MEMS Sensors Dynamics

Crosslisted with: AREN 862

Prerequisites: Instructor permission

Description: Study of the dynamics of Microelectromechanical system (MEMS) beam-structures. Modeling principles and data analysis from different types of MEMS will be explained along with deep theoretical and experimental investigation of nonlinear MEMS dynamics. Learn to conduct experiments using state-of-the-art MEMS characterization tools.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

AREN 492 INDIVIDL INSTRCTN IV

Credit Hours: 1-3

Min credits per semester: 1

Max credits per semester: 3

Max credits per degree: 3

Format: IND

AREN 494 Special Topics IV

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC