

SYLLABUS

Description: The objective of this course is to provide a *capstone* design experience in Architectural Engineering. The objective will be met through the complete and integrated engineering design of a modest commercial building. The building design process will be followed through conceptual design, schematic design, and design development. Students will work in small teams with members working on all aspects of architectural engineering design, including structural, HVAC, electrical, plumbing, and lighting. Students will also evaluate the architectural design in the context of life safety and acoustic considerations. Final submissions will be professional-quality design documents.

Lectures: 11:00 – 12:15 Tuesday and Thursday, Room ECCE 246A
3:00 – 5:00 Friday, Room ECCR 110

Website: <http://ceae.colorado.edu/~brandem/aren4317/>

Instructor: Michael J. Brandemuehl
ECCE 246 (above CAD Lab)
492-8594, michael.brandemuehl@colorado.edu

Office Hours: 3:30 – 5:00 Tuesday
1:00 – 2:30 Wednesday

Expected Preparation: This course is designed to be taken in the final semester of your undergraduate program. You are expected to meet the following prerequisites

AREN 3010 Mechanical Systems for Buildings
AREN 3540 Illumination 1
AREN 4570 Building Electrical Systems
AREN 3406 Introduction to Building Construction
CVEN 3525 Structural Analysis
ARCH 4010 Architectural Design

Course Delivery

Professor Brandemuehl is the instructor of record for this course. He will be assisted by faculty within the department and practicing engineers from the Boulder/Denver area. These faculty members and practitioners will make presentations on material from their discipline. They will consult, evaluate and grade work in their discipline submitted by students. The final grade for the course will be issued by the instructor of record based on their input.

The course will be delivered through both lectures and individual consultation. Lectures for the course are concentrated early in the semester. These lectures will include review of design methodologies, recommended approaches, and expectations for your deliverables. There will also be a series of invited lectures on design-related topics throughout the semester.

Much of the scheduled class time will be used for consultation with faculty and practitioners. In general, faculty consultants will post sign-up sheets outside their offices for teams to schedule consultations. In addition, each team will meet with the instructor weekly.

There will be three presentations during the semester with varying levels of formality. The first presentation will describe the program plan for your building and will outline the basic building requirements. The presentation is expected to highlight the architecture of the building and is typically a PowerPoint presentation. The second and most substantial presentation, also typically delivered with

PowerPoint, will describe the schematic design of the building and its engineering systems. The third presentation will be a working presentation of design development drawings and calculations to the consultants in the various disciplines. There will be no final presentation of your designs – only the final submittal.

Teams

All work performed in this course will be done in teams or three to five people. While your input will be considered in the team selection, the instructor will ultimately assign the composition of teams. Based on the information provided in the attached survey, teams will be assembled on the basis of their interest and background. Each member will have lead responsibility for one of the disciplines that are the focus of this course. However, it is expected that all team members will participate in all areas of design.

Deliverables

The work and subsequent deliverables for this course will follow the stages of industry practice: Conceptual Design, Schematic Design, Design Development, and Construction Documents. All submittals will be electronic as portable document format (PDF) files. Submittals will typically involve records of computations, descriptive reports, and drawings. Computations will vary from engineering estimates using rules of thumb to results of elaborate computer-based simulations. Reports will usually be brief, and clarity, completeness, and concision will be required. Drawings will vary from annotated sketches to professionally executed CAD drawings fully labeled, dimensioned, and annotated. The final submissions that document each stage of the design process will be expected to possess a unity of presentation style, be well organized for easy navigation, and be accompanied by a letter of transmittal. **Late submissions will not be accepted.**

Course Evaluation

The course evaluation will be based completely on the design project deliverables and participation. There will be no exams or homework. Design submission will have an overall grade as well as a grade for each discipline (structural, mechanical, electrical, etc.). The overall grade will be allocated to each team member and the discipline-specific grade will be allocated to the responsible team member.

Participation	10%
Conceptual Design	5%
Schematic Design Presentation	15%
Final Design Submission	70%

General Information

1. If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and www.Colorado.EDU/disabilityservices
2. Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. See full details at http://www.colorado.edu/policies/fac_relig.html
3. The University of Colorado at Boulder policy on Discrimination and Harassment (<http://www.colorado.edu/policies/discrimination.html>), the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships applies to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://www.colorado.edu/odh>
4. All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html>.

AREN 4317, 2006, Fall Schedule

	Tuesday, 11:00 - 12:15 ECCE 246	Thursday, 11:00 - 12:15 ECCE 246	Friday, 3:00 - 5:00 ECCR 110
1	28-Aug Introduction, survey and team assignments	30-Aug Architecture presentations Group presentations	31-Aug Team Meetings No Class
2	4-Sep Architectural Design for Life Safety	6-Sep HVAC and Acoustic Conceptual Design Michael Brandemuehl	7-Sep Team Meetings No Class
3	11-Sep Lighting Conceptual Design Lighting Faculty	13-Sep Electrical Conceptual Design Moncef Krarti	14-Sep Integrated Team Meeting In-Class Discussions
4	18-Sep LEED Rating System	20-Sep Consultations No Class	21-Sep Structural Schematic Design Structural Engineer
5	25-Sep Structural Schematic Design Conceptual Design Submittal	27-Sep Consultations No Class	28-Sep Consultations No Class
6	2-Oct Structural Schematic Design Structural Engineer	4-Oct Cost Estimating and Scheduling Construction Faculty	5-Oct HVAC Schematic Design Michael Brandemuehl
7	9-Oct Illumination Schematic Design Lighting Faculty	11-Oct Electrical Schematic Design Moncef Krarti	12-Oct Acoustic Design Michael Brandemuehl
8	16-Oct TBA Guest Speaker	18-Oct Plumbing Schematic Design Michael Brandemuehl	19-Oct Consultations No Class
9	23-Oct TBA Schematic Design Submission	25-Oct Schematic Design Presentations	26-Oct Schematic Design Presentations
10	30-Oct Illumination Design Development Lighting Faculty	1-Nov HVAC Design Development Michael Brandemuehl	2-Nov Electrical Design Development Moncef Krarti
11	6-Nov TBA Guest Speaker	8-Nov Integrated Design In-Class Discussions	9-Nov Consultations No Class
12	13-Nov TBA Guest Speaker	15-Nov TBA Guest Speaker	16-Nov Consultations No Class
13	20-Nov Thanksgiving	22-Nov Thanksgiving	23-Nov Thanksgiving
14	27-Nov Preliminary Submittal and Critique Structural Design	29-Nov Preliminary Submittal and Critique HVAC Design	30-Nov Preliminary Submittal and Critique Lighting Design
15	4-Dec Preliminary Submittal and Critique Electrical Design	6-Dec Cost Estimate and Scheduling Project Submission	7-Dec Consultations No Class
16	11-Dec Consultations No Class	13-Dec Final Design	

DRAFT

AREN DESIGN SURVEY

Name: _____ Student ID Number: _____

Email: _____ Telephone Number: _____

Course Background

Course	Description	When Taken
AREN 3010	Mechanical Systems for Buildings	
AREN 3540	Illumination I	
AREN 4570	Building Electrical Systems Design	
CVEN 3406	Intro to Building Construction	
CVEN 3525	Structural Analysis	
ARCH 4010	Architectural Design	
AREN 4110	HVAC System Design	
AREN 4550	Illumination II	
CVEN 4545	Steel Design	
CVEN 4555	Reinforced Concrete Design	

Teams

There are three main design components to be addressed in this course. To assist in the development of design teams, state your interest and expertise in these areas. Specifically identify your area of greatest interest and your area of least interest

Structural _____

Mechanical _____

Electrical/Lighting _____

Construction Management _____

In which of the following areas do you consider yourself particularly skilled:

 Drawing/AutoCAD Writing Public Speaking

List any appropriate work experience related to building design or construction (engineering internships, construction jobs, etc.)

List your preferences for other members of the team. (No guarantees.)

List up to five classmates who you specifically would NOT want on your team. (If you would rather not risk a classmate seeing this information on your form, feel free to email me.)