ARCH 403 SYLLABUS

Overall Summary:
This class provides an opportunity for the developing architect to understand the impact of energy transfer systems on buildings, the relationship between the architectural design and the implementation of these systems, and the total impact of both the architectural design and the energy transfer systems on the greater environment. Students successfully completing the course at a minimum will develop a series of tools they can use in their design development, and ideally will change drastically their design approach.

The classroom is run like a design firm. The expectations of all in the room (including the instructor) are similar to those in the workplace. The goals and guidelines below provide specific direction on how this overriding principle is put into practice, but in all cases, the expectation is that the “workplace” and “deliverables” are treated as you would for an employer.

Course Goals
• Successful participation in the course will develop architects who are informed about whole building design and the integration of MEPFP systems design with architecture.
• Students will be able to determine the energy and environmental impact of their building designs, both on the internal and external environment.
• Students will be able to describe, using proper terminology, the integrated design process and how it varies from the conventional design process.
• Students will understand the basic components of MEPFP systems and terminology.
• Students will understand the basic concepts of MEPFP systems design.
• Students will be able to list all aspects of the MEPFP design process, recognize proper documentation of MEPFP systems, and identify field-installed components.

Instructor and Teaching Assistants (Group Manager and Support Staff)
• Joseph Clair itmechelec@gmail.com
  • Office hours: 4pm Thursday in Wishnick Lobby and by appointment
• Ramin Ghods and Soledad Hernandez Gomez
  • Office hours: TBA (at least 4 hours total per week)

Class Timings and Location (work schedule)
• Tuesdays and Thursdays 5:00 p.m. to 6:15 p.m.
• Wishnick Hall 113

Resources (Employees need to provide)
• Mechanical and Electrical Equipment for Buildings Eleventh Edition
  Benjamin Stein, John S. Reynolds, Walter T. Grondzik and Alison G. Kwok
• iPad
• Apps for the iPad: Blackboard Mobile™ and eClicker Audience
  (Provided by Instructor)
• ASHRAE Standards and Guidelines (will be made available online as needed)
• Case studies (will be posted online as appropriate)

Instructional Tools
• Textbook
• Lectures (including guest lectures)
Deliverables:
Self-scheduled written and online assignments
In-class design guides
“Field trips” – outside of class time

Classroom Policies (based on workplace policy)
Productive employees show up on time and devote their full attention to the work to be done as a sign of respect for themselves and their fellow employees.

- Class doors close 5 minutes after the start of class. Any students arriving after that point will be considered late for work and not given credit for attending that day. Any student leaving before the end of class will also be considered as not having attended. (see attendance policy)
- iPads allowed for class-related work. If used for non-class related activities, students will be considered absent for that class. Cellphone use is not permitted during class.
- Attendance – IIT policy
  - The work hours for a firm are set for the benefit of collaboration and productivity. Unless sick, employees are expected to be at work on-time and ready to work as a sign of respect to themselves and their fellow employees.
  - Attendance at all twenty-nine class meetings is considered mandatory for all students.
  - Students will sign for themselves electronically for each class. Students signing for another student will be considered as doing the work of another student under the plagiarism policy.
  - Students that have not signed in are considered absent.
  - Students that arrive late or leave early are considered absent.
  - Any unexcused absence the student will lose 22 points from the final grade.

Deliverables
Working individuals show their value to an organization through the consistent delivery of high quality work products. Professionals do not use another's work without proper reference, and never attempt to get paid for using the work of another. Each individual contributing value to the firm is considered paramount to the success of the business.

- Plagiarism – IIT policy
  - All work in this class is considered individual and must be, in totality, the work of the person whose name is on the assignment. Cooperative work is not allowed unless directed by the instructor.
  - Online collaboration and study groups are encouraged, but when composing assignments, students should treat the assignment like a test.
  - Examples: #1 - Student A and B sit down to work on a homework assignment. They discuss possible answers to the problems, then write down their answers on their pages. This falls under cooperative work and would not be allowed in the class.
    #2 – Student A, B, C and D form a study group. After receiving an assignment, they review the section of the text and lecture notes associated with the assignment, and come to an agreed understanding of the material and what the assignment asks. They then work individually to solve the assignment. This would not be cooperative work and is encouraged.
  - Students violating the IIT or class plagiarism policies will receive a consequence that varies from a zero for the assignment up through removal from the class at the discretion of the instructor.
online assignments will result in a minimum consequence of a zero for the assignment and a deduction of 20 points from the final grade for each occurrence.

- All handwritten work will be turned in at a box located in the 3rd year studio. (Those not in the 3rd year studio should become familiar with the location of the drop box.) Each student will supply a folder with pockets on which the student’s name is written. This folder will be used to collect and turn-back graded work.
- Essay assignments are placed in the Digital Dropbox of Blackboard and are due at the time noted. Online assignments will be completed using Blackboard with times noted by the Instructor.
- Late work will lose 5% for each calendar day (including weekends) that the assignment is late. Grading of late work will be done based upon the availability of the professor and TA and is not guaranteed to be available immediately to the student.
- Make up written homework and in-class assignments only with doctor’s letter or for absences excused by college administration. No make-up of online assignments.
- Following instructions for turning in work, grammar, spelling, and clarity are all important aspects of the quality of work and compensation will include these elements along with content.

Compensation: Grading Policy

*Compensation reflects an agreed upon structure for the firm recognizing the contribution of the employee. Professionals understand what the firm expects of them, and do not attempt to get more value for their service than they are due.*

- **Grading**
  - Online Homework: 15 assignments at 20 points each 300 points
  - Written Essays: 15 assignments at 20 points each 300 points
  - Written Homework: 7 assignments at 50 points each 350 points
  - Charette Deliverables: 50 points
  - Interview: 100 points
  - Total possible compensation: 1100 points

*Value:*

- A = 951-1100 points
- B = 851-950 points
- C = 726-850 points
- D = 601-725 points
- E = 600 points or fewer

- Grading of deliverables objectively reflects the value the student has earned (points) in completing the assignments. Questions about grading should be first directed to the TA, and should focus on understanding what the student did that resulted in them not earning the credit. Errors in grading do occur, and it is expected that students, TAs and the instructor will discuss the question in a professional manner. Any issues that cannot be resolved between the TA and the student will be directed to the instructor for final determination.

**AMERICANS WITH DISABILITIES (ADA):** Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must go through the Center for Disability Resources office. The Center for Disability Resources (CDR) is located in Life Sciences Room 218, telephone 312 567.5744 or disabilities@iit.edu.
Class Topics:

1. **Introduction and Design Process (Chapters 1, 2, 3)**
   - **Skill:** Able to describe integrated design and how it varies from conventional design.
   - **Skill:** Define all building services and why they are needed.
   - **Skill:** Understand the differences among codes, standards and best practices (guidelines) and how each affects the design process.
   - **Tool:** Able to create and interpret a Design Intent Narrative.

2. **Energy**
   - **Skill:** Able to define energy efficiency and quantify building performance.
   - **Tool:** Understand ASHRAE Guideline 0 – Commissioning
   - **Tool:** Understand ASHRAE Standard 189.1 – Green Buildings
   - **Tool:** Understand ASHRAE 90.1 & 90.2 and their application to the design process
   - **Tool:** Understand the Architecture 2030 Challenge and its ramifications on the design process
   - **Tool:** Able to construct a thermal gradient and applying it to design

3. **Heating Load/Thermal Comfort (Chapters 4, 7, 8)**
   - **Skill:** Define and quantify thermal comfort (Chapter 4, 8.2)
   - **Skill:** Understand the concept of heat loss (Chapter 7)
   - **Skill:** Able to read and interpret documentation associated with heating systems
   - **Tool:** Understand ASHRAE 55 and its application to the design process (Chapter 4.2)
   - **Tool:** Able to calculate the heat loss from a building using conceptual elements (Chap. 8.1, 8.2, 8.8, 8.9)

4. **Passive Heating (Chapters 6, 8) (GL)**
   - **Skill:** Able to identify and describe passive heating solutions to satisfy heat load (Chap 6, 8.1, .2, .4, .10)
   - **Tool:** Able to quantify performance of passive heating systems

5. **Heating Systems (T) (Chapters 9, 10)**
   - **Skill:** Able to identify active heating solutions to satisfy heat load
   - **Skill:** Understand how to compare performance of passive and active heating systems
   - **Tool:** Able to identify and calculate the energy waste in a heating system

6. **Ventilation Load/IAQ (Chapter 5)**
   - **Skill:** Able to define acceptable indoor air quality and indentify pollutant sources
   - **Tool:** Understand ASHRAE 62.1 and its application to the design process
   - **Tool:** Able to calculate ventilation requirements based upon program elements

7. **Natural Ventilation (Chapter 5, 8)**
   - **Skill:** Able to identify and describe natural ventilation systems (Chapter 8.6)
   - **Tool:** Able to quantify natural ventilation system performance (Chapter 8.14)

8. **Mechanical Ventilation (T) (Chapters 9, 10)**
   - **Skill:** Able to identify active ventilation systems, their components, and their application
   - **Skill:** Understand how to compare performance of natural and active ventilation systems

9. **Building Heating and Ventilating Systems (GL) (Chapters 9, 10)**
   - **Tool:** Able to identify and calculate the energy waste in a ventilation system
   - **Tool:** Able to create an exploded zoning image of the building
   - **Tool:** Able to calculate three-dimensional space requirements for heating/ventilation systems
   - **Skill:** Able to read and interpret documentation associated with ventilation systems

10. **Lighting Load/Visual Comfort (GL) (Chapters 11, 12, 13, 14)**
    - **Skill:** Define quality indoor lighting
    - **Tool:** Understand IESNA standards and their application to the design process

11. **Daylighting (Chapter 14)**
    - **Skill:** Able to design spaces for effective natural lighting
    - **Tool:** Able to quantify daylighting applications

12. **Artificial Lighting (Chapters 15, 16)**
    - **Skill:** Identify lighting systems, their components and their application
    - **Skill:** Able to compare performance of daylighting and artificial lighting systems
    - **Skill:** Able to read and interpret documentation associated with lighting systems
    - **Tool:** Able to quantify artificial lighting applications
    - **Tool:** Able to identify and calculate energy waste in lighting systems
    - **Tool:** Able to calculate the three-dimensional space requirements for lighting systems

13. **Charette**
    - **Skill:** Work in groups to define an objective, measure progress, and complete a task.
Charette (GL)
Skill: Effectively balance competing interests to maximize benefit while minimizing resources.

Charette
Skill: Effectively communicate design intent and progress.

Finals Week: Interviews
Summary Skill: Able to identify trade-offs necessary to achieve optimal heating, ventilation and lighting design through orientation, envelope selection and space allocation.

Note: Skills are conceptual processes or understandings that take continuous application to gain proficiency. Tools are documentable processes or references that do not have to be memorized, but rather can be saved and used over and over again.