

Prof. Lukasz Sztaberek
Email: LSztaberek@citytech.cuny.edu
Office Hours: By appointment

ENVC 2321 – Air Conditioning Systems Laboratory II
Fall 2022



Course rationale and implementation

The syllabus and a sample assignment (lab report) attached with this letter is for the writing-intensive course ENVC 2321, titled “Air Conditioning Systems Laboratory II”. It is a laboratory class where students perform various measurements (temperatures and pressures of refrigerants, supply air volumetric flow rates and temperatures for several ac units of different design, etc.). After collecting their data students process it and calculate performance of ac units tested in class, among variety of other exercises. The Writing Intensive part is included in every lab report (each week), where students need to answer several questions at the end of their lab report. They are required to use full sentences and professional vocabulary while answering these questions, displaying an understanding of the mechanisms and protocols of experiments. Students are also required to list references used for their lab report. With this approach we want to make sure that students understood the material covered in class. By constructing lab reports in this fashion, we scaffold the entire assignment. Students start with measurements performed in class, under a supervision of their instructor, then a series of calculations are performed by each student. All the required equations used in each experiment are given with the lab report. Then the students summarize their findings and answer theoretical questions related to the experiment performed.

By assigning work every week instead of requiring only a couple of larger projects in this class, we are able to verify very early in the semester how our students perform and provide them with the necessary tools. That approach gives a lot of possibilities to provide students with feedback and ideally observe their improvement as the semester proceeds. It also allows to use minimal marking very effectively, emphasizing what students did correctly rather than criticizing their mistakes. Since every week students are given a new assignment, with a structure and grading procedure similar to each other, by implementing minimal grading we are implementing forward-looking feedback. To be successful with this approach, we have to make sure that the grading procedure is clear and consistent. To achieve that, we clearly state in each assignment, how many points are accorded to each question, and also make sure that students know exactly what they are asked to do. This type of grading that is based on particular tasks, keeps students engaged in the

process from the very beginning to the end of their assignment. It is also a great idea to ask students who did the best in specific aspects of their work to share their results/findings/thoughts with the rest of the group. The scaffolding practice would also make clear to what extent the student has grasped concepts.

In this WI-course, the goal is to make students to realize that writing and critical thinking are not as simple as just following formulas and guidelines. They require practice that will be achieved while completing correctly formulated, writing-centric assignments. Sharing their findings with their classmates definitely helps in expressing ideas and prepares students to interact with others in their future careers.

COURSE DESCRIPTION:

In this course students will acquire knowledge and skills necessary to evaluate the performance of air handling and air conditioning systems. Students will use a sling psychrometer, barometer, Pitot tube, draft gauge, Alnor Velometer, flow measuring hood, multi-point temperature recorder, and sound level meter. They will conduct operational and testing procedures for HVAC system pneumatic and digital controls.

This course is designated as a “Writing Intensive” in NYC College of Technology’s curriculum. Every week students will complete their lab reports, including results of measurements taken during class meeting, calculations, results summary, and explanation of related definitions and troubleshooting of assigned problems.

Course Objectives/Outcomes:

Upon completion of this course, the student will know: methods of evaluating the performance of air handling and air conditioning systems; operating and testing procedures for HVAC system pneumatic controls; and use of a sling psychrometer, barometer, Pitot tube, draft gauge, Alnor Velometer, flow measuring hood, wattmeter, tachometer, and Amprobe meter.

At the beginning of each class there will be a short lecture on the equipment that day. After that students, following guidelines from the instructor, will perform various tests and measurements.

Note taking during the experiments is strongly recommended in order to complete lab reports.

Individual laboratory reports are required on the performance testing of ducts, diffusers, registers, split and rooftop air conditioning systems, and an air conditioning system with a chiller and cooling tower. Students will have two weeks to turn in their completed lab reports.

Although the concepts of this course are technical in nature, the practice of writing and completing assignments on a weekly basis ensure that students have grasped concepts and protocols to the extend where they could present their findings to their peers in professional settings.

Prerequisites: ENVC 1110, ENVC 1111

3

lab hrs, 1 cr.

Pre- or corequisite: ENVC 2322

Text: Laboratory instruction sheets and notes will be supplied in class.

COURSE OUTLINE - FIFTEEN WEEKS

WEEK 1 Thursday, August 25th

- Introduction and discussion of the course outline and what makes this course WI
- Lecture on “Psychrometry” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today

WEEK 2 Thursday, September 1st

- Recap and discussion of the free write component from previous week
- Lecture on “Pitot Tube and Draft Gauge” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today

WEEK 3 Thursday, September 8th

- Recap and discussion of the free write component from previous week
- Lecture on “Centrifugal Fan Performance” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today
- Lab Report 1 due

WEEK 4 Thursday, September 15th

- Recap and discussion of the free write component from previous week
- Lecture on “Vaneaxial Fan Performance” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today
- Lab Report 2 due

WEEK 5 Thursday, September 22nd

- Recap and discussion of the free write component from previous week
- Lecture on “Measurement of Air Conditioning System Performance - Rooftop Unit” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today
- Lab Report 3 due

WEEK 6 Thursday, October 6th

- Recap and discussion of the free write component from previous week
- Lecture on “Measurement of Air Conditioning System Performance - Split System” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today
- Lab Report 4 due

WEEK 7 Thursday, October 13th

- Recap and discussion of the free write component from previous week
- Lecture on “Measurement of Air Conditioning System Performance - Heat Pump System” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today
- Lab Report 5 due

WEEK 8 Thursday, October 20th

- Recap and discussion of the free write component from previous week
- Lecture on “Centrifugal Pump Performance” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today
- Lab Report 6 due

WEEK 9 October 27th

- Recap and discussion of the free write component from previous week
- Lecture on “Water Cooled Chiller Performance” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today
- Lab Report 7 due

WEEK 10 November 3rd

- Recap and discussion of the free write component from previous week
- Lecture on “Measurement of Air Conditioning System Performance - Single Package Air

- Cooled Air Conditioner” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today
- Lab Report 8 due

WEEK 11 November 10th

- Recap and discussion of the free write component from previous week
- Lecture on “HVAC System Controls - Calibration and Throttling Range Adjustment of a Pneumatic Thermostat” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today
- Lab Report 9 due

WEEK 12 November 17th

- Recap and discussion of the free write component from previous week
- Lecture on “HVAC System Controls - Pneumatic Thermostat Control of a Heating-Cooling System” followed by the experiment and data collection
- Discussion of the results followed by in-class free write on what part of the experiment was the most challenging and what was a new skill you have learned today
- Lab Report 10 due

WEEK 13 Thursday, December 1st

- Recap and discussion of the free write component from previous week
- Lecture on “HVAC System Controls - Programming and Operation of a Commercial Programmable Thermostat” followed by the experiment and data collection
- Discussion of the results. In-class free write (two paragraphs) on what part of the material throughout the semester is the most challenging and what in your opinion is the most valuable skill you have learned so far
- Lab Report 11 due

WEEK 14 Thursday, December 9th

- Recap and the summary of the semester
- Lecture on “HVAC System Controls - Programming and Operation of an Electronic Stand-Alone Controller” followed by the experiment and data collection
- Discussion of the results

- Lab Report 12 due

WEEK 15 Thursday, December 15th

- Lab Reports 13 and 14 due
- **Final Exam**

COURSE GRADING STANDARDS

LABORATORY PROJECTS (average of 14 lab reports)

75% of the final grade

FINAL EXAMINATION

25% of the final grade

Grading Rubric

Each lab report has data collection and calculation component. Maximum number of points for each question/equation is given next to it. There is a Writing Intensive component at the end of each lab report, worth 20% maximum of the overall lab report grade. Below is the grading rubric for that component:

- 20%

1. Main idea: Answers are correct and well presented
2. Style: Sentences are clear with excellent use of punctuation; style suited to audience and purpose
3. Grammar and mechanics: Excellent grammar, spelling, syntax and punctuation
4. Quotations and Works Cited: Conforms to Author-Date Style

- 15%

1. Main idea: answers are mostly correct and well presented
2. Style: Sentences are clear but a few may be awkward and there may be a few punctuation errors and may be unsuited to audience and purpose
3. Grammar and mechanics: A few errors in grammar, spelling, syntax and punctuation, but not many
4. Quotations and Works Cited: Conforms to Author-Date Style

- 10%

1. Main idea: Answers are not entirely correct; ideas are vaguely expressed
2. Style: Sentences are generally clear but may have awkward structure or unclear content. Little use of specific examples and details; mostly generalized examples and little description
3. Grammar and mechanics: Shows a pattern of errors in spelling, grammar, syntax and/or punctuation
4. Quotations and Works Cited: Does not conform to Author-Date Style or not cited at all

- 5%
- 1. Main idea: Answers are not correct
- 2. Style: Sentences are not clear
- 3. Grammar and mechanics: Continuous errors
- 4. Quotations and Works Cited: Does not conform to Author-Date Style or not cited at all

After an experiment is completed, reports are due on or before the date specified by the instructor, and grades of late reports may be reduced. However, for those experiments where graded reports have been returned to the class, no additional reports will be accepted. It is the responsibility of the student to make up any class work that is missed.

A grade of "I" will be granted only if the instructor is convinced that the student has good and sufficient reasons for not submitting the required number of reports and completing the required number of projects.

ATTENDANCE

College policy allows that a student may be absent without penalty for 10% of the number of scheduled class meetings during the semester as follows:

Class Meets	Allowable Absence
1 time/week	2 classes
2 times/week	3 classes
3 times/week	4 classes

Absences and lateness in excess of the college's 10% guideline will result in a reduced grade and may be cause for a grade of "F".

ACADEMIC INTEGRITY

Students and all others who work with information, ideas, texts, images, music, inventions and other intellectual property owe their audience and sources accuracy and honesty in using crediting and citation of sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, Academic Dishonesty is prohibited in the City University of New York and is punishable by penalties, including failing grades, suspension and expulsion.