

# **EML4600: Refrigeration and Air Conditioning**

## **Syllabus -- Fall 2022-- Section 261A**

*(Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on the course web site and announced in class.)*

1. **Catalog Description:** Refrigeration and air conditioning; apparatus and their applications to the industrial, commercial and residential fields (with emphasis on heavy commercial and institutional building applications). Credits: 3
2. **Pre-requisites:** Pre-requisite: *EML 3100*
3. **Course Objectives:** The course provides a broad coverage of refrigeration and air conditioning theory and practice in order to prepare students for a career in industry, consulting engineering practice or for further graduate studies with a specialization in refrigeration and/or air conditioning. This course will help achieve the following ABET outcomes: (1) enhance the engineering students' technical competence in mathematics, science and engineering, (2) enhance the students' ability to identify, formulate and solve engineering problems, and (3) increase the students' understanding of the impact of engineering solutions in a global and societal context and finally (4) to enhance the engineering students' ability to apply knowledge to practice.
4. **Instructor:**  
Kurt Schulze, PhD, PE
  - Office location: MAE-A 328
  - Telephone: 392-9929
  - Email address: [schulzek@ufl.edu](mailto:schulzek@ufl.edu)
  - Office hours: Monday's, 8th period, 3:00- 3:50; Wednesday's, 8th period, 3:00-3:50 or by appointment.
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T/A: TBD

  - Office location, contact info and office hours see Canvas
5. **Meeting Times and Location by Section:**
  - M,W,F; 9<sup>th</sup> period, 4:05 -4:55PM; room LAR 330
  - Course schedule is tentative. It may be modified as the class progresses.
  - There will be four in class Exams. No "final" during finals week
6. **Material and Supply Fees:** None
7. **Laptop:** Laptop must be able to run Windows based software which is used for homework and exams. Software will be provided
8. **Textbooks Required :**  
None: Students will be able to obtain the *ASHRAE Fundamentals* Book as part of their student membership to ASHRAE if they choose to do so.
9. **Recommended Reading:** *ASHRAE Fundamentals*, *Systems and Applications Handbooks*

**10. Relation to Program Outcomes (ABET):**

<b>Outcome</b>	<b>Coverage*</b>
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	High
3. An ability to communicate effectively with a range of audiences	
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Low
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Medium
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

**11. Tentative Course Outline and Schedule:**

<b>Week of</b>	<b>Topic</b>	<b>Recommended Reading Assign.</b>	<b>Comments</b>
August 22	Thermal Comfort and Moist Air Properties McQuay software	Chapters 6, 8, 9,12 and 13, ASHRAE Fundamentals Hdbk.	ASHRAE Stds. 55 and 62 First class is 23 August
August 29	Heat Transfer in Buildings McQuay Software	Chapters 3, 25,23,24,26	
September 5	Carrier HAP software	Notes and Chapters 1,2, 35 and 36	Sept. 5 is a holiday
September 12	Solar Radiation/Fenestrations	Chapter 31	

	Exam review Exam 1 Sept 18 during class hours		Exam date and time subject to change.
September 19	The Heating Load	Chapters 29 and 30	
September 26	The Cooling Load System Selection	Chapters 29 and 30	
October 3	Cooling Load Continued/ Exam Review	Notes and software	
October 10	Energy Calculations Exam #2 Oct 14 during class hours	Notes and Chapter 32	Exam date and time subject to change.
October 17	Vapor Compression Refrigeration.	Chapters 1, 19 and 20	
October 24	Misc. Refrigeration Cycles and Absorption Refrigeration	Notes	ASHRAE std 15
October 31	Hydronic System ECMS Fundamentals (pump and pipe design)	Notes, Chapter 36	
November 7	Air Distribution System Fundamentals LEEDS Discussion Exam #3 Nov 10 during class hours	Chapters 33 and 35	Exam date and time subject to change. November 11 is holiday, homecoming
November 14	Air Distribution System Fundamentals and Review	Chapters 35	
November 21	AI & HVAC Controls	Chapter 15	November 23-25. Holidays
November 29	Cost Estimating, Life Cycle Cost Analysis and Life Cycle Assessment	Notes	
December 6	Exam #4 Dec 7 during class hours Classes end on Dec. 7	Notes	PLEASE NOTE, Exam date and time subject to change

12. **Attendance and Expectations:** During class, cell phones must be turned off.

Class attendance is expected but will not be monitored. *Lectures will not be recorded.* Since there is no text, your best resource are the notes you take in class. You are responsible for participating, staying up to date on all announcements, in-class lectures, posted course material, and homework. Excused absences for homework submission and quizzes must be consistent with university policies in the undergraduate catalog and requires appropriate documentation. Homework extensions and make-up quizzes will be provided for excused absences in which notification is provided before the assignment due date.

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

There will be four exams and homework. All exams will be cumulative but will emphasize the most recently covered material. The exams will be scheduled during class periods but is subject to change. **PLEASE NOTE.** The test dates may change depending on the pace of class. Students are responsible to be available to take tests during the announced day and time. No exceptions but for sickness or emergency. See the course schedule for exam dates.

The relative weighting of the Homework and Exams will be:

a) Homework	50%
b) Exams	50%

Homework is important! Homework problems must be turned in at the start of class unless otherwise directed. Late HW will not be accepted.

If a student feels that an exam or homework is graded unfairly, or if there is an error in the grading, it should be brought to the attention of the instructor within two weeks after the graded material is handed back. Scores will not be reconsidered beyond the two-week period. The grading scale is a general guide; the course instructor reserves the right to adjust the final numerical grading demarcations

**Grading Scale:** 95-100 A, 90-94 A-,85-89 B+, 80-84 B, 75-79 B-,70-74 C+, 65-69C, 65-68 C-,60-64 D+, 55-59 D,50-54 D-

13. **Make-up Policy:** No late assignments will be accepted. Makeup exams are not normally allowed. If you cannot attend an exam or cannot meet a due date, you must contact the instructor prior to the exam or due date. Arrangements will be made for students on a case by case basis. (Failure to contact the instructor prior to the exam or assignment prior to the due date will result in a zero on that exam/assignment.)
14. **Honesty Policy** – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.
15. **Accommodation for Students with Disabilities** – Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.
16. **UF Counseling Services** – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
  - UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
  - Career Resource Center, Reitz Union, 392-1601, career and job search services.
17. **Software Use** – All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.
18. **Class Demeanor**-- Class is started on time. On many occasions, notes have already been placed on the board to expedite starting on time. Students are expected to be on time or early. Engineers are expected to be on time for meetings and you are expected to be on time for classes. Turn off cell phones, etc. before coming into class.
19. **Course Evaluation** - Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive

from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

## 20. Health and Wellness Related to COVID-19

In response to COVID-19, the following practices are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- The wearing approved face coverings is optional as this current update.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email [covid@shcc.ufl.edu](mailto:covid@shcc.ufl.edu)) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

## 21. In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

## 22. Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, [jpennacc@ufl.edu](mailto:jpennacc@ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

### 23. Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

### 24. Campus Resources:

#### Health and Wellness

##### **U Matter, We Care:**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**Counseling and Wellness Center:** <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

##### **Sexual Discrimination, Harassment, Assault, or Violence**

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, [title-ix@ufl.edu](mailto:title-ix@ufl.edu)

##### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

#### Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling;  
<https://career.ufl.edu>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus**: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

**On-Line Students Complaints**: <http://www.distance.ufl.edu/student-complaint-process>.