Energy Transfer Operations

ECH 3223 Section 6243 / OL05
Class Periods: Monday / Wednesday /Friday, Period 8 (3:00 – 3:50 pm)
Location: Section 6243: PSY 0151; Section OL05: Online
Academic Term: Spring 2021

Instructor:

Prof. Charles Hages
Assistant Professor, Chemical Engineering Department, University of Florida
Office: ChE Room 417
E-mail address: c.hages@ufl.edu
Office telephone: 352-294-7002
Office hours: TBD
Web site: UF course Canvas web site

Access Information:

Section OL05: The zoom link for lectures can be found on the Canvas course calendar. Lectures will be given synchronously during the scheduled lecture time unless specified otherwise; a certain number of lectures may be delivered asynchronously via recorded videos (with a link posted to Canvas) depending on the course content.

Section 6243: Lectures will take place in PSY 0151 for these students cleared by HR to return to campus. Students not cleared to return to campus can use the zoom link (found on the Canvas course calendar) until their status is cleared.

Office Hours

Office hours will be held exclusively over zoom. The time for these office hours will be determined following consultation with students for availability. A zoom link will be provided via the Canvas course calendar for these office hours.

Final Exam

As determined by the registrar, the final exam for this course will be on 4/28/2021 @ 3:00 PM – 5:00 PM

Course Description

Steady state conduction in solids and heterogeneous materials, transient conduction, convection heat transfer, heat transfer during boiling and condensation, radiation heat transfer, design of heat-transfer equipment and heat exchange networks.

Credit Hours: 3

Course Pre-Requisites / Co-Requisites

All students should have successfully passed Computer Model Formulation (COT 3502) and Elementary Transport Phenomena (ECH 3264).

Required Textbooks and Software

- *Fundamentals of Heat and Mass Transfer*, 8th ed., by Bergman, and Lavine, WILEY. ISBN 9781119320425.

  Note: The material is essentially the same in the 7th edition if you happen to use that edition. However, the book problems are different. I will load a guide to link the recommended problems from the 8th edition to the corresponding problems in the 7th edition, however not all problems can be found in the 7th edition. Use at your own discretion.

- Python. Can be installed for free using the Anaconda package: https://www.anaconda.com/products/individual

Course Objectives

Upon completion of this course the student will be able to:

1. Explain the basics of heat transfer including Newton's law of cooling, Fourier's law, and concepts concerning heat transfer coefficients and dimensionless numbers
2. Derive a mathematical description of heat transfer problems using shell balances in Cartesian, cylindrical, and spherical coordinates
3. Be able to solve unsteady and multi-dimensional heat transfer problems using the knowledge of the equations of change and knowing how to perform separation of variables and/or similarity transformations
4. Learn how to design heat exchanger networks and evaporators

Materials and Supply Fees

N/A

Recommended Materials

Not applicable.

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Assessed
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	Assessed
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	
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	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Course Schedule

The course will proceed according to the following ***tentative*** schedule; this is provided to give a rough timeline for the course and corresponding chapters in the textbook. Updates will be posted on Canvas.

Week 1: Intro / General heat diffusion equation	(Chapters 1 & 2)
Week 2: General heat diffusion equation & boundary conditions	(Chapters 1 & 2)
Week 3: 1D steady-state heat diffusion / Thermal resistance	(Chapter 3)
Week 4: Fins	(Chapter 3)
Week 5: Fins	(Chapter 3)
Week 6: Transient conduction	(Chapter 5)
Week 7: Transient conduction	(Chapter 5)
Week 8: Transient conduction / 2D steady-state conduction	(Chapter 5 &4)
Week 9: 2D steady-state conduction	(Chapter 4)
Week 10: 2D steady-state conduction	(Chapter 4)
Week 11: Convection	(Chapters 6)
Week 12: External Flow	(Chapters 7)
Week 13: Internal Flow	(Chapter 8)
Week 14: Heat Exchangers	(Chapter 11)
Week 15: Heat Exchangers	(Chapter 11)

Attendance Policy, Class Expectations, and Make-Up Policy

- Attendance of lectures is highly recommended, though not required.
    - Note: Students who signed up for the in-person section (6243) are expected to attend lecture in person if cleared to return to campus. The zoom link for lectures is provided for students in the online section (OL05) and students who are temporarily not cleared to return to campus.
- Up to 49% percent of the lecture material may be delivered exclusively online, in which case all students can access the material over the course zoom link or via prerecorded asynchronous videos, for which links will be provided. Students will be given advance notice of any lectures which will not occur live or in-person via an announcement on the Canvas page.
- Homework assignments are due via file uploads on Canvas before the start of lecture on the day they are due. As we will often go over homework problems in class, late homework cannot be accepted. Please work on assignments well in advance – don't wait until the last minute!
    - Note: The lowest homework grade will be dropped – therefore, if you are late for one of the assignments it won't hurt your homework grade.
- Dates and format for exams 1 and 2 will be announced at least 2 weeks in advance. The final exam is scheduled by the registrar and I have no ability to change this.
- Requests for make-up exams will be considered only for those students who missed due to an acceptable reason (illness, family emergencies, military obligation, religious holidays, participation in official university activities, etc.) as listed in the undergraduate catalog. It is required that, whenever possible the student notifies the instructor about the situation prior to the exam, preferably at least two weeks in advance. *https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx*
- Students arriving late for an exam will be given only the balance of time remaining to complete their work unless an acceptable reason (see above) is provided.

F2F Course Policy in Response to COVID-19

A face-to-face instructional section (6243) will be provided to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.
- Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.
- **If you are experiencing COVID-19 symptoms (Click here for guidance from the CDC on symptoms of coronavirus), please use the UF Health screening system and follow the instructions on whether you are able to attend class.** Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms.
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. Find more information in the university attendance policies.

What should I do if someone I live with or have frequent contact with tests positive or starts showing symptoms? What should I do if I test positive or start showing symptoms?

1. First and foremost, stay home. Do not come into class and put others at risk.
2. File a report with UF Screen, Test, and Protect (STP). Arrange to get tested and/or plan to quarantine. This will change your status to "not cleared" to return to campus. **You may not come into the lectire without at least one negative test result after your symptoms are gone or after the full 2-week quarantine period.** Either one of these should change your "not cleared" status back to "cleared". We cannot mandate testing, but you will not be allowed back into the building without "cleared" status.
3. Finally, make sure that you follow up with UF for the contact tracing / quarantine interview.

   *Note: If you are unable to get food/supplies to quarantine properly, let me know and I will help get you what you need. If, for whatever reason, you are unable to afford a test, please let me know and we will figure something out.

Following and enforcing these policies are all our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution, the revocation of lab/building access, and grade penalties, up to and including failing the course.

Online Course Recording

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Evaluation of Grades

Assignment	Percentage of Final Grade
Homework*	10%
Exam 1**	25%
Exam 2**	25%
Final Exam**	35%
Professionalism	5%

* Only one problem on each homework will be graded. The lowest homework grade will be dropped.

** All assessments are cumulative.

Grading Policy

Final grades will be assigned using the standard deviation (σ) method. The scale for the course will be as follows:

Percent	Grade	Grade Points
Mean + σ < Score	A	4.00
Mean + 0.67σ < Score ≤ Mean + σ	A-	3.67
Mean + 0.33σ < Score ≤ Mean + 0.67σ	B+	3.33
Mean < Score ≤ Mean + 0.33σ	B	3.00
Mean – 0.33σ < Score ≤ Mean	B-	2.67
Mean – 0.67σ < Score ≤ Mean - 0.33σ	C+	2.33
Mean – σ < Score ≤ Mean - 0.67σ	C	2.00
Mean – 1.33σ < Score ≤ Mean - σ	C-	1.67
Mean – 1.67σ < Score ≤ Mean – 1.33σ	D+	1.33
Mean – 2σ < Score ≤ Mean – 1.67σ	D	1.00
Mean – 2.33σ < Score ≤ Mean – 2σ	D-	0.67
Score ≤ Mean – 2.33σ	E	0.00

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Instructor may lower the threshold for attaining the letter grades specified above (to the benefit of the students), but will not raise the threshold.

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

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/.

University Honesty Policy
UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

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
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use
All faculty, staff, and students 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.

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

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 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: http://www.counseling.ufl.edu/cwc, 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

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 suppor*t*, 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://www.crc.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://care.dso.ufl.edu.

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