

EML 4140 Section 261H – Heat Transfer Fall 2021

Class Periods: MWF6 12:50-1:40

Location: WEIL 270

Instructor

- Subrata Roy, Ph.D.
- Office location: MAEB 336
- Office Hours: TBD
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Teaching Assistants

Raju Bhatia

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Riasta Azim

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Office location and hours: (Please contact through the Canvas website, <http://elearning.ufl.edu/>)

This course is in collaboration with the other Heat Transfer section, 191A. This means the course content will be the same for both sections. Homework assignments and exams will be scheduled and due at the same time for each section. The advantage to the student will be better consistency of content between sections. Also, the T/As for both Heat Transfer sections will be available to provide help to any Heat Transfer student, regardless of which section assigned. This will afford students greater options in obtain help, if necessary.

Course Description:

Steady-state and transient analysis of conduction and radiation heat transfer in stationary media. Heat transfer in fluid systems, including forced and free convection. Credits:3

Course Pre-Requisites / Co-Requisites

CGS 2425, EML 3100, EGM 4313

Course Objectives and Outcomes

This course provides an intermediate level coverage of thermal transport processes via conduction, convection, and radiation heat transfer. This course stresses fundamental engineering science principles applied to engineering thermal analysis. Students will learn to apply the conservation of energy to control volumes and express the conservation of energy through mathematical formulations, including both steady-state and transient analyses, with emphasis on the fundamental physics and underlying mathematics associated with heat transfer. Upon completion of this course, students are expected to understand basic heat transfer problem formulation and solution techniques, coupled with a strong foundation and appreciation for the physics of heat transfer.

Program Objectives and Outcomes:

EML 4140 supports several educational objectives enumerated in the Mission Statement of the Department of Mechanical and Aerospace Engineering. Specific objectives supported by this course include 1) To understand and perform engineering analyses in the area of thermal systems, 2) To comprehend quantitative, analytical, and experimental methods, 3) To acquire the knowledge base, confidence, and mental discipline for self-education and a lifetime of learning.

Materials and Supply Fees: None

Professional Component (ABET):

EML 4140 supports several program outcomes enumerated in the Mission Statement of the Department of Mechanical and Aerospace Engineering. Specific ME program outcomes supported by this course include:

- (1) Using knowledge of chemistry and calculus-based physics with depth in at least one of them (ME Program Outcome M1);
- (2) Using knowledge of advanced mathematics through multivariate calculus and differential equations (ME Program Outcome M2);
- (3) Being able to work professionally in the thermal systems area (ME Program Outcome M4).

Mathematics	15%
Physical Sciences	15%
Engineering Science	70%

Relation to Program Outcomes (ABET):

Outcome
(a) Apply knowledge of mathematics, science, and engineering: Outcome (a), method of assessment is specially selected problems on three exams and homework.
(e) Identify, formulate, and solve engineering problems: Outcome (e), method of assessment is specially selected problems on three exams and homework.
(i) Recognize the need for, and engage in lifelong learning: Outcome (i), method of assessment is attending professional seminars on Heat Transfer and a comprehensive Final Exam
(k) Use the techniques, skills, and modern engineering tools necessary for engineering practice: Outcome (k), method of assessment is specially selected problems on three exams and homework

Required Textbooks and Software

T.L. BERGMAN, A.S. LAVINE, F.P. INCROPERA, & D.P. DEWITT, “**Fundamentals of Heat and Mass Transfer**,” 8th Edition, Wiley. This course is participating in UF All Access, which is a program designed to provide the most affordable option for students. <https://www.bsd.ufl.edu/G1C/bookstore/allaccess.asp>

- The required course material is delivered digitally through WileyPlus, containing a fully searchable etext and the required homework for this course. You may purchase an access code at a discounted price by going to this link:

<https://www.bsd.ufl.edu/G1C/bookstore/UFAllAccessInstructions.pdf>

This link authorizes the cost of the access code to be charged directly to your student financials account.

Attendance and Expectations: Lecture attendance is imperative. Although attendance will not be taken or used in assigning grades, students will be held responsible for knowing all changes made to scheduling and all class announcements. There is a direct correlation between class attendance and class success. During class, cell phones must be turned off or muted. Don’t bring food to class.

Note: Although information will be posted on the website, class announcement prevail in case there are discrepancies.

Assessment Methods and Grading: Homework will be assigned throughout the semester. Homework will be graded. Homework will be due as indicated on the assignment.

Please submit your solutions ONLY via Canvas. The HW problems may be downloaded from the course web site <https://lss.at.ufl.edu/> (use Canvas system).

There will be three midterm exams and one Final Exam during the semester in class. Will announce exam at least one week in advance. All exams will be cumulative but will emphasize the most recently covered material. The exams will be during the regular class period. Exams will be scheduled at the same day as the other section Heat Transfer with exception of Final. Each exam will primarily focus on specific chapters or major topics in the course. However,

you may be required to understand and apply material from prior chapters in order to solve exam problems. Use of Chegg, CourseHero or other websites designed to provide live expert help on quizzes is cheating.

The week of the exams are tentatively shown on the schedule and as follows:

Exam #1 on Conduction 30 Sep, 7:30-8:30 pm, no class on 1 Oct

Exam #2 on Convection 28 Oct, 7:30-8:30 pm, no class on 29 Oct

Exam #3 on Radiation week of 29 Nov, details to follow

Final Exam as scheduled on Final's week

The relative weighting of the HW Problems and Exams in the final grade will be:

- | | |
|-------------------------------|----------------|
| a. HW | 10% |
| b. Midterm Exams | 60% (20% each) |
| c. Final Exam (Comprehensive) | 30% |

All exams are closed book. For the first 3 exams, you may bring in 1 sheet of paper (8.5" x 11.5") with whatever notes you want on both the front and back. On the final exam, you may bring 3 sheets of paper with notes on the front and back. NO collaboration is allowed during exams! If we must shift to virtual, this maybe amended.

In general, exams will closely follow homework problems in scope and complexity. Late assignments 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, please bring it to the instructor attention within a week after the graded material is handed back. Scores will not be reconsidered beyond the one week period.

Honorlock

Honorlock **will** be used proctor your exams this semester. Honorlock is an online proctoring service that allows you to take your exam from your home. You do not need to create an account, download software or schedule an appointment in advance. Honorlock is available 24/7 and all that is needed is a computer, a working webcam, and a stable Internet connection. To get started, you will need Google Chrome and to download the Honorlock Chrome Extension. You can download the extension at www.honorlock.com/extension/install. Honorlock will be recording your exam session by webcam as well as recording your screen. Honorlock also has an integrity algorithm that can detect search-engine use, so do not attempt to search for answers, even on a secondary device.

Grading Scale:

A 10-point scale (i.e. A>90%, B>80%, etc.) will be used as a baseline for final grades. An additional curve may be applied, as determined by the overall final grade distribution of the class. Intermediate grades will be determined at my discretion and are not based on a 5-point scale (e.g., 85%).

If you cannot attend an exam or cannot meet a due date, you must contact the instructor at least 1 week prior to the exam or due date. Failure to contact the instructor prior to the exam will result in a zero on that exam. Arrangements will be made for students involved in conflicting official university activities.

Make-up Policy: No late assignments will be accepted. Make up exams are not normally allowed. If you cannot attend an exam or cannot meet a due date, you must contact the instructor at least 1 week prior to the exam or due date. Failure to contact the instructor prior to the exam will result in a zero on that exam. The only exception is sudden acute illness or an emergency. Arrangements will be made for students involved in conflicting official university activities.

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but

students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/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://www.dso.ufl.edu/sccr/process/student-conduct-honor-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.

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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.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 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://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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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

Notes on Homework Problems

- Homework (HW) problems are an essential element of this course.
- Students are encouraged to discuss the general principles involved in the homework sets with one another, but the detailed solution of each problem should be completed individually. Submitting a HW solution that is directly copied from another source is considered a violation of the honesty policy.
- Before solving a problem, students should draw a **schematic** of the physical problem to be considered and think about the appropriate **assumptions** and mathematical formulation for the basic laws that you consider necessary for solutions.

COVID-19 related issues:

We will have face-to-face instructional sessions 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 expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- 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) 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.

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.

Class Demeanor: Class is started on time. On many occasions, notes have already been placed on the board to expedite starting time. Students are expected to be on time or early. Engineers are expected to be on time for meetings and this is an excellent habit to cultivate! Turn off cell phones, etc, before coming into class.

Reading material: Subject to change!

Convection: 6 weeks

Chapters 1 and 2

Chapter 3 (omit 3.2)

Chapter 4 (omit 4.2, 4.3, 4.5)

Chapter 5 (omit 5.8, 5.9)

Conduction: 4 weeks

Chapter 6 (omit 6.7 and 6.8)

Chapter 7 (omit 7.5 through 7.8)
Chapter 8 (omit 8.6 through 8.9)
Chapter 9 (9.1 - 9.3, plus things covered in class lectures)
Chapter 10 (follow class lecture)

Radiation: 4 weeks

Chapter 12 (omit 12.9)
Chapter 13 (follow class lecture)