# Heat Transfer

EML 4140 Section 191A
***Class Periods:*** MWF, Period 3, and 9:35 AM – 10:25 AM
***Location:*** FLG 0260
***Academic Term:*** Fall 2025

***Instructor:***
Dr. Jaeyun Moon
jaeyun.moon@ufl.edu
Office Hours: MF 12:30 – 2 pm at NEB 444 (Temporary). Location will change to NEB 529 upon announcement.

***Teaching Assistant/Peer Mentor/Supervised Teaching Student:***
Please contact through the Canvas website

- Katherine Walsh, katherine.walsh@ufl.edu, Office Hours: 2:00 – 3:00 pm (Th, Remote)
- Jody Zhu, zhujody@ufl.edu, Office Hours: 10:30 – 11:30 am (W)
- Zach Arzt, zarzt@ufl.edu, Office Hours: 2:00 – 3:00 pm (Tu)

In-person TA Office Hour Location: NEB 526

***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***
MAP 2302 with minimum grade of C and (EAS 4101 or EGN 3353C).

***Course Objectives***
This course provides an intermediate level coverage of thermal transport processes via conduction, convection, and radiation heat transfer. It stresses fundamental engineering science principles applied to 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 solution techniques, coupled with a strong foundation and appreciation for the physics of heat transfer.

***Materials and Supply Fees***
None

***Relation to Program Outcomes (ABET):***
The table below is an example. Please consult with your department's ABET coordinator when filling this out.

| Outcome | Coverage* |
|---|---|
| 1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics | High |
| 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 | Medium |
| 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 | Medium |

| | |
|---|---|
| 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 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 | Medium |

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

***Required Textbooks and Software***

- Fundamentals of Heat and Mass Transfer, by Bergman, Lavine, Incorpera, and Dewitt (6th, 7th, and 8th editions)

***Recommended Materials***

- A Heat Transfer Textbook, 6th ed by Lienhard IV and Lienhard V, Available for free at https://ahtt.mit.edu/

***Required Computer***

Recommended Computer Specifications: https://it.ufl.edu/get-help/student-computer-recommendations/
*HWCOE Computer Requirements: https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/*

***Course Schedule***

Week 1: Introductory Content, Chapter 1
Week 2: Introduction to Conduction, Chapter 2
Week 3: One-Dimensional, Steady-State Conduction, Chapter 3
Week 4: One-Dimensional, Steady-State Conduction, Chapter 3
Week 5: Two-Dimensional, Steady-State Conduction, Chapter 4
Week 6: Transient Conduction, Chapter 5
Week 7: Transient Conduction, Chapter 5 / Introduction to Convection, Chapter 6
Week 8: Introduction to Convection, Chapter 6
Week 9: External Flow, Chapter 7
Week 10: External Flow, Chapter 8
Week 11: Free Convection, Chapter 9
Week 12: Heat Exchangers, Chapter 11
Week 13: Radiation: Processes and Properties, Chapter 12
Week 14: Radiation: Processes and Properties, Chapter 12/Radiation Exchange Between Surfaces, Chapter 13
Week 15: Radiation Exchange Between Surfaces, Chapter 13

Actual schedule may be subject to changes.

***Important Dates***

*October 3rd Exam 1 (9:35 AM – 10:25 AM, FLG 0260)*
*November 7th Exam 2 (9:35 AM – 10:25 AM, FLG 0260)*
*December 10th Final Exam (10:00 AM – 12:00 PM, FLG 0260)*

All times are in EST and exams are on-site only.

***Evaluation of Grades***

| Assignment | Percentage of Final Grade |
|---|---|
| Homework Sets | 20% |
| Midterm 1 | 25% |
| Midterm 2 | 25% |
| Final Exam | 30% |
| Total | 100% |

***Homework***

HW assignments will be posted to Canvas and you will have one week to submit electronically via the Canvas assignment portal. No email or hard copy submissions will be accepted. Answers should be clearly marked and all writings should be legible. All problem solutions and grades will be posted on Canvas. Late submission policies are: (i) if late within 24 hours, your maximum score will be 80%, (ii) if late by more than 24 hours but less than 48 hours, your maximum score will be 60%, and (iii) if late by more than 48 hours, you will get a zero.

See the last page for an example homework solution format.

***Exams***

Exams are closed-book but you are allowed to use one sheet of letter-sized paper (8.5" by 11.5") with your **hand-written** notes on **one side** for the midterm exams and **two sides** for the final exam. If you cannot attend the scheduled exams due to non-emergency events (e.g., conflicts with official university activities), you must contact Dr. Moon 1 week prior to the exam and provide documentation. Make-up exams will only be given in very rare instances (e.g., medical and family emergencies) with documentation and/or pre-approval by Dr. Moon. If the final exam score (out of 100%) is higher than one of the midterm exams, final exam score will replace the midterm exam score. For instance, you received 70% and 90% on the midterms and 92% on the final. Your exam scores will then be 92%, 90%, and 92%. However, midterm exam scores cannot replace the final exam score and your final exam score cannot be used for any missed midterm exam scores.

***Grading Policy***

| Percent | Grade | Grade Points |
|---|---|---|
| 90.0 - 100 | A | 4.00 |
| 86.7 - 89.9 | A- | 3.67 |
| 83.4 - 86.6 | A | 3.33 |
| 80.0 - 83.3 | B+ | 3.00 |
| 76.7 - 79.9 | B | 2.67 |
| 73.4 - 76.6 | B- | 2.33 |
| 70.0 - 73.3 | C+ | 2.00 |
| 66.7 - 69.9 | C | 1.67 |
| 63.4 - 66.6 | D+ | 1.33 |
| 60.0 - 63.3 | D | 1.00 |
| 0 - 59.9 | E | 0.00 |

Homework and exam grade questions should first be addressed to teaching assistants, responsible for grading. Additional curves may be applied, as determined by the overall grade distribution of the entire class. Dr. Moon will award 1-2% bonus credit for active participants in class discussions and office hours at Dr. Moon's discretion.

***Attendance Policy, Class Expectations, and Make-Up Policy***

Students are responsible for participating, **staying up-to-date on all announcements**, in-class lectures, posted video lectures (*if any*), reading assignments, and homework. Although class attendance will not be used for assigning grades, it is critical that students attend the class regularly for the successful completion of this course. Requirements

for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:
https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

**Notice of Copyright**
Materials in this course – unless otherwise indicated – are protected by United States copyright law [Title 17, U.S. Code]. Materials are presented in an educational context for personal use and study and should not be shared, distributed or sold in print – or digitally – outside the course without permission.

**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/.

***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.

***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/process/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.

***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

***Academic Policies & Resources***

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

***Commitment to a Positive Learning Environment***

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

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

- Your academic advisor or Undergraduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu

# HOMEWORK SOLUTION EXAMPLE FORMAT

**Find:**
State concisely what the problem is asking for.

**Schematic:**
Draw a schematic of the problem. Label important variables. Be sure to identify and show appropriate control volume and surfaces, if applicable.

**Known:**
Properties known. What is given in the problem?

**Assumptions:**
Assumptions are the start of your analysis process to simplify the problem. State all the assumptions you are making.

**Analysis:**
Show clear logical process to finding the answer to the problem. It helps to write down your plan on how you are going to solve it. Then, show each step.

**Answer:**
Clearly mark your answer.