Heat & Mass Transfer in Biological Systems

ABE3612C Section 0129
Class Periods: MWF | Period 5 | 11:45 A.M. – 12:35 P.M. & R | Periods 7-9 | 1:55 P.M.– 4:55 P.M.
Location: MWF | ROG 211 & R | MCCB 2102 or ROG 160 (Laboratory)
Academic Term: Fall 2023

Instructor
Dr. William Pelletier
wpelletier@ufl.edu
(352) 294-6701
Office Hours: MWF 12:45 P.M. – 1:45 P.M. & and by appointment
Office Location: 101 Frazier Rogers Hall

Teaching Assistant
TBD
Office Hours: TBD
Office Location: TBD

Course Description
Transport phenomena, steady and unsteady-state heat conduction, radiation, free and forced convection, mass transfer, psychometrics and thermodynamics of biological processes. *4 Credits*

Course Co-Requisites
ENV 3040C or CGN 3421 or ESI 4327C or (COP 2271 and COP 2271L)

Course Objectives

1. Provide students with the fundamental knowledge needed to successfully practice the profession of agricultural and biological engineering in the area of heat and mass transfer.
2. Train students to design, test, and analyze systems and processes that involve transport phenomena.
3. Train students to formulate and solve heat and mass transfer problems and to use modern computational and experimental equipment.

Upon successful completion of this course, the student should be capable of analyzing heat and mass transfer processes and making design calculations for many agricultural and biological engineering applications. This course will help students develop their ability to: 1. identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics; 4. to communicate effectively with a range of audience.

The course will consist of three (3) online lectures and one (1) laboratory per week, problem sets, quizzes, projects and examinations. Some of the laboratory sessions will be used to work example problems, for projects, discussions, lectures and exams. Laboratory sessions where students will have to be present on campus will be planned a minimum of two (2) weeks in advance and will be scheduled in collaboration with students to make sure they occur in a safe small-group environment, as per the most current University of Florida safety guidelines.

Materials & Suppy Fees
N/A

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	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	
3.	An ability to communicate effectively with a range of audiences	Low
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.

Required Textbook
Heat and Mass Transfer: Fundamentals & Applications
Yunus A. Çengel & Afshin J. Ghajar
2020 6th Edition (eBook with Connect is required)

All required online assignments and the interactive eBook for this course are available in Connect. You have access to Connect through Canvas or the link below. Additional details are provided in the document *UF All Access Registration Connect Fall 2022* in Canvas.

`https://connect.mheducation.com/class/w-pelletier-abe3612c---fall-2023`

Recommended Material
N/A

Course Schedule (subject to change)

Week 1	23-Aug	25-Sep	M	**No Class**	Week 9	16-Oct	20-Oct	M	Numerical Methods
			W	Syllabus				W	Numerical Methods
			R	Introduction and Basic Concepts				R	**Laboratory 3 - Num. Methods**
			F	Heat Conduction Equation				F	Numerical Methods
Week 2	28-Aug	1-Sep	M	Heat Conduction Equation	Week 10	23-Oct	27-Oct	M	External Forced Convection
			W	Heat Conduction Equation				W	External Forced Convection
			R	Heat Conduction Equation				R	**Supervised Exercises**
			F	Heat Conduction Equation				F	Internal Forced Convection
Week 3	4-Sep	8-Sep	M	**Labor Day**	Week 11	30-Oct	3-Nov	M	Internal Forced Convection
			W	Heat Conduction Equation				W	Internal Forced Convection
			R	Heat Conduction Equation				R	**Exam 2**
			F	Steady Heat Conduction				F	Internal Forced Convection
Week 4	11-Sep	15-Sep	M	Steady Heat Conduction	Week 12	6-Nov	10-Nov	M	Internal Forced Convection
			W	Steady Heat Conduction				W	Internal Forced Convection
			R	**Laboratory 1 - Introduction**				R	**Veterans Day**
			F	Steady Heat Conduction				F	Internal Forced Convection
Week 5	18-Sep	22-Sep	M	Steady Heat Conduction	Week 13	13-Nov	17-Nov	M	Internal Forced Convection
			W	Steady Heat Conduction				W	Natural Convection
			R	**Supervised Exercises**				R	Heat Exchangers
			F	Transient Heat Conduction				F	Heat Exchangers
Week 6	25-Sep	29-Sep	M	Transient Heat Conduction	Week 14	20-Nov	24-Nov	M	Heat Exchangers
			W	Transient Heat Conduction				W	**Thanksgiving**
			R	**Exam 1**				R	**Thanksgiving**
			F	Transient Heat Conduction				F	**Thanksgiving**
Week 7	2-Oct	6-Oct	M	Transient Heat Conduction	Week 15	27-Nov	1-Dec	M	Heat Exchangers
			W	Transient Heat Conduction				W	Heat Exchangers
			R	**Laboratory 2 - Transient H.T.**				R	Radiation Heat Transfer
			F	**Homecoming**				F	Radiation Heat Transfer
Week 8	9-Oct	13-Oct	M	Transient Heat Conduction	Week 16	4-Dec	8-Dec	M	Radiation Heat Transfer
			W	Numerical Methods				W	Radiation Heat Transfer
			R	**Laboratory 2 - Transient H.T**				R	**Reading Day**
			F	Numerical Methods				F	**Reading Day**

Attendance Policy, Class Expectations, and Make-Up Policy

- Attendance (on time) at lectures and laboratory sessions is expected from all students at all times. Attendance accounts for 10% of your final grade and will be monitored using a sign-in sheet. Students will be warned if they are late at several occasions. Following a second warning, late attendances will be counted as missed lectures.
- Assignments must will have to be submitted online in pdf format through Canvas. Scanned versions of handwritten problems are expected; calculations do not have to be typed for homework assignments. Assignments will be marked down for a sloppy presentation and, if excessive, they may be returned un-graded. Laboratory and project reports, including all calculations, must be typed. Homework assignments as well as laboratory and project reports must be turned in before class begins. Assignments returned late, before 4:00 P.M. on the day they were due, will be marked down by 10% of their total. Assignments returned late, before 4:00 P.M. on the day following the due date will be marked down by 50% of their total . No assignments will be accepted after 4:00 P.M. on the following day (due times may be subject to change, follow Canvas instructions associated with each assignment). **For all online submissions, it is the student's responsibility to ensure that the correct file is uploaded on Canvas and a late submission penalty may be applied**. If technical difficulties with Canvas were to occur, students can email the file to wpelletier@ufl.edu to avoid a late submission (if you email a copy , also upload a "late" copy in Canvas).
- No make-up exams or quizzes will be given except for valid medical reasons or unless prior arrangements have been made.

- Excused absences must be consistent with university policies in the undergraduate catalog (link provided in the next item) and require appropriate documentation.
- 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/`

Evaluation of Grades

Assignment	Percentage of Final Grade
Final Exam [1](12/12 3:00 P.M.–5:00 P.M.)	20%
Midterm Exams (tentative dates: 9/28 & 11/2 1:55 P.M.)	40% (20% each)
Homework & Reading Assignments	20%
Attendance	10%
Laboratories, Quizzes and Final Project [2]	10%
TOTAL	100%

[1] Students that have cumulated an average of A for the first two examinations, submitted all homework assignments (high quality), the final project (high quality), and show excellent attendance (A) to class (including the period after the second examination) will be exempt from writing the final examination and will receive an A for the class. If all of the above conditions are not met, a student will have to write the final examination.
[2] Grades will be distributed between laboratory attendance, quizzes, reports, and the final project.

Grading Policy

Percent	Grade	Grade Points
[90 – 100%]	A	4.00
[87 – 90%[	A-	3.67
[84 – 87%[	B+	3.33
[80 – 84%[	B	3.00
[77 – 80%[	B-	2.67
[74 – 77%[	C+	2.33
[70 – 74%[	C	2.00
[67 – 70%[	C-	1.67
[64 – 67%[	D+	1.33
[60 – 64%[	D	1.00
[57 – 60%[	D-	0.67
[0 – 57%[	E	0.00

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

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 laboratory 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 Conduct 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 TA in this class.

Commitment to a Safe and Inclusive 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, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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
- HWCOE Human Resources, (352) 392-0904, student-support-hr@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: `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

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 Connections 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`.