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 129 & R | ROG 129 or ROG 160 (Laboratory)
Academic Term: Fall 2025

Instructor
Dr. William Pelletier
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(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 complex engineering problems by applying principles of engineering, science, and mathematics; 3. communicate effectively with a range of audiences.

The course will consist of three (3) online lectures and one (1) laboratory per week, problem sets, quizzes, projects and examinations. Laboratory sessions will also be used to work example problems, for quizzes, projects, discussions, lectures and exams.

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 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
2025 7th Edition (2025 Release - 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 and help are provided in the document *UF All Access Registration Connect Fall 2025* in Canvas and in the link below.

Access: `https://connect.mheducation.com/class/w-pelletier-abe3612c---fall-2025`
Help: `https://www.mheducation.com/highered/support/support-at-every-step/connect/first-day-of-class/ia-canvas-ltia`

Recommended Material
N/A

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 (subject to change)

Week 1	18-Aug	22-Sep	M	**No Class**	Week 9	13-Oct	17-Oct	M	Numerical Methods
			W	**No Class**				W	Numerical Methods
			R	Introduction and Basic Concepts				R	**Laboratory 3 - Num. Methods**
			F	Heat Conduction Equation				F	**Homecoming**
Week 2	25-Aug	29-Aug	M	Heat Conduction Equation	Week 10	20-Oct	24-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	01-Sep	05-Sep	M	**Labor Day**	Week 11	27-Oct	31-Oct	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	08-Sep	12-Sep	M	Steady Heat Conduction	Week 12	03-Nov	07-Nov	M	Internal Forced Convection
			W	Steady Heat Conduction				W	Internal Forced Convection
			R	**Laboratory 1 - Introduction**				R	Internal Forced Convection
			F	Steady Heat Conduction				F	internal Forced Convection
Week 5	15-Sep	19-Sep	M	Steady Heat Conduction	Week 13	10-Nov	14-Nov	M	Internal Forced Convection
			W	Steady Heat Conduction				W	Natural Convection
			R	**Supervised Exercises**				R	Natural Convection
			F	Transient Heat Conduction				F	Heat Exchangers
Week 6	22-Sep	26-Sep	M	Transient Heat Conduction	Week 14	17-Nov	21-Nov	M	Heat Exchangers
			W	Transient Heat Conduction				W	Heat Exchangers
			R	**Exam 1**				R	Heat Exchangers
			F	Transient Heat Conduction				F	Radiation Heat Transfer
Week 7	29-Sep	03-Oct	M	Transient Heat Conduction	Week 15	24-Nov	28-Nov	M	**Thanksgiving**
			W	Transient Heat Conduction				W	**Thanksgiving**
			R	**Laboratory 2 - Transient H.T.**				R	**Thanksgiving**
			F	Transient Heat Conduction				F	**Thanksgiving**
Week 8	06-Oct	10-Oct	M	Numerical Methods	Week 16	01-Dec	05-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 be submitted 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. Laboratory reports, including all calculations, must be typed. Assignments due date and time will be published in Canvas. 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. Assignments will not be accepted after 4:00 P.M. on the day following there due date. **For all online submissions, it is the student's responsibility to ensure that the correct file is uploaded on Canvas. A penalty may be applied if an incorrect document is uploaded**. 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 when possible).
- No make-up exam will be allowed except for valid medical reasons or unless prior arrangements have been made.
- No make-up will be allowed for missed in-class quizzes. If a student's absence is excused, any missed in-class quiz will not be included in the student quiz grade.

- 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](12/09 10:00 A.M.–12:00 P.M.)	20%
Midterm Exams (tentative dates: 9/25 & 10/30 1:55 P.M.)	40% (20% each)
Homework Assignments	15%
Attendance	10%
In-Class Quizzes	5%
Laboratories (attendance and report) and Online Quizzes	5%
Final Project (due 12/05)	5%
TOTAL	100%

[1] Students who have cumulated an average of A for the first two examinations, submitted all homework assignments (high quality), quizzes (A), the final project (high quality), and show excellent attendance (A) to class (including lectures following the second examination) will be exempt from writing the final examination and will receive an A for the class. If any of the above conditions is not met, the student will have to write the final examination.

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`

Academic Policies & Resources
To support consistent and accessible communication of the university-wide student resources, Academic Policies & Resources are available online at `https://go.ufl.edu/syllabuspolicies`

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