Heat and 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: ROG 129
Academic Term: Fall 2019

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 Assistants:
Please contact through the Canvas website.
Carola Sanchez
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Office Hours: TBD
Office Location: 141 Frazier Rogers Hall

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; 2. to communicate effectively with a range of audiences.

The course will consist of three (3) 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.

Materials and Supply Fees
N/A

Professional Component (ABET):
This course contributes four (4) credit hours toward meeting the minimum 48 credit hours of Engineering Topics in the basic-level curriculum for the Bachelor of Science Degree in Biological Engineering.

Relation to Program Outcomes (ABET):

Outcome		Coverage*
1.	An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	High
2.	An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.	
3.	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	
4.	An ability to communicate effectively with a range of audiences	Low
5.	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.	
6.	An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.	
7.	An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty	

*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 and 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. To get started, click the first Connect assignment in your Canvas course. You'll be prompted to either login with an existing Connect account username and password, or to create a new account. Then enter your access code, purchase access online or begin your 14-day Courtesy Access period. Once you've completed your selection, you'll arrive at the start of your first Connect assignment. In Connect, every question links directly to the eBook. This means that when you are struggling with a question you can go directly to the explanation in the eBook for help without carrying around a heavy textbook. You can access the eBook from any computer, any time. If you also want to purchase a print text, you can buy a discounted loose-leaf version of your book within Connect with the click of a button.

Course Schedule (subject to change)

Week 1	**19-Aug**	**23-Aug**	**M**	**No Class**	**Week 9**	**14-Oct**	**18-Oct**	**M**	Numerical Methods
			W	Syllabus				**W**	Numerical Methods
			R	Introduction and Basic Concepts				**R**	Numerical Methods
			F	Heat Conduction Equation				**F**	Numerical Methods
Week 2	**26-Aug**	**30-Aug**	**M**	Heat Conduction Equation	**Week 10**	**21-Oct**	**25-Oct**	**M**	Numerical Methods
			W	Heat Conduction Equation				**W**	External Forced Convection
			R	Heat Conduction Equation				**R**	**Laboratory 3 - Numerical Methods**
			F	Heat Conduction Equation				**F**	External Forced Convection
Week 3	**2-Sep**	**6-Sep**	**M**	**Labor Day**	**Week 11**	**28-Oct**	**1-Nov**	**M**	External Forced Convection
			W	Heat Conduction Equation				**W**	External Forced Convection
			R	Heat Conduction Equation				**R**	**Supervised Exercises**
			F	Steady Heat Conduction				**F**	Internal Forced Convection
Week 4	**9-Sep**	**13-Sep**	**M**	Steady Heat Conduction	**Week 12**	**4-Nov**	**8-Nov**	**M**	Internal Forced Convection
			W	Steady Heat Conduction				**W**	Internal Forced Convection
			R	**Laboratory 1 - CR10**				**R**	**EXAM II**
			F	Steady Heat Conduction				**F**	Internal Forced Convection
Week 5	**16-Sep**	**20-Sep**	**M**	Steady Heat Conduction	**Week 13**	**11-Nov**	**15-Nov**	**M**	**Veterans Day**
			W	Steady Heat Conduction				**W**	Internal Forced Convection
			R	**Supervised Exercises**				**R**	Internal Forced Convection
			F	Steady Heat Conduction				**F**	Internal Forced Convection
Week 6	**23-Sep**	**27-Sep**	**M**	Transient Heat Conduction	**Week 14**	**18-Nov**	**22-Nov**	**M**	Natural Convection
			W	Transient Heat Conduction				**W**	Heat Exchangers
			R	**EXAM I**				**R**	Heat Exchangers
			F	Transient Heat Conduction				**F**	Heat Exchangers
Week 7	**30-Sep**	**4-Oct**	**M**	Transient Heat Conduction	**Week 15**	**25-Nov**	**29-Nov**	**M**	Radiation Heat Transfer
			W	Transient Heat Conduction				**W**	**Thanksgiving**
			R	**Laboratory 2 - Transient**				**R**	**Thanksgiving**
			F	**Homecoming**				**F**	**Thanksgiving**
Week 8	**7-Oct**	**11-Oct**	**M**	Transient Heat Conduction	**Week 16**	**2-Dec**	**6-Dec**	**M**	Radiation Heat Transfer
			W	Transient Heat Conduction				**W**	Radiation Heat Transfer
			R	**Laboratory 2 - Transient**				**R**	**No Class**
			F	Numerical Methods				**F**	**No Class**

Attendance Policy, Class Expectations, and Make-Up Policy

- Attendance (on time) at lectures and laboratory sessions is expected from all students at all times. A sign-in sheet is used and monitor attendance which accounts for 10% of your final grade. 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 presented on 8.5" x 11" paper; on one side only. 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 (assignment must be emailed if submitted on a Saturday). No assignments will be accepted after 4:00 P.M. on the following day.
- No make-up exams or quizzes will be given except for valid medical reasons or unless prior arrangements have been made.
- Cell phones must be silenced prior to the start of class and exams.
- No food will be permitted.
- Excused absences must be consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

Evaluation of Grades

Assignment	Percentage of Final Grade
Final Exam[1] (12/10 at 12:30 P.M.)	20%
Midterm Exams (expected dates: 09/26 and 11/08 at 1:55 P.M.)	40% (20% each)
Homework and 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.*
2. *Grades for 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 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.

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 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.