

Advanced Heat and Mass Transfer in Biological Systems

ABE6615 Class 23109

Class Periods: MWF | Period 5 | 11:45 A.M. - 12:35 P.M.

Location: ROG 129

Academic Term: Spring 2020

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:

TBD

Office Hours: TBD

Office Location: TBD

Course Description

Analytical and numerical technique solutions to problems of heat and mass transfer in biological systems. Emphasis on nonhomogeneous, irregularly shaped products with respiration and transpiration. 3 Credits

Course Co-Requisites

COP 2271 and ABE3612C

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 identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.

The course will consist of three (3) lectures per week, problem sets and projects.

Materials and Supply Fees

N/A

Optional Textbooks

- Heat and Mass Transfer: Fundamentals & Applications
Yunus A. Çengel and Afshin J. Ghajar
2020 McGraw Hill 6th Edition, 1018 p.
- Analytical Heat Diffusion Theory
A. V. Luikov
1968 Academic Press, 685p.
- Heat Conduction
D. W. Hahn and M. N. Özışık
2012 John Wiley & Sons 3rd Edition, 718 p.
- Various technical papers

Course Schedule (subject to change)

Week 1	6-Jan	10-Jan	M Introduction W Introduction to Heat Transfer F Introduction to Heat Transfer	Week 9	2-Mar	6-Mar	M Spring Break W Spring Break F Spring Break
Week 2	13-Jan	17-Jan	M Heat Conduction Equations W Heat Conduction Equations F Applied Mathematics in Heat Transfer	Week 10	9-Mar	13-Mar	M SoV in Cylindrical Coordinates W SoV in Cylindrical Coordinates F SoV in Spherical Coordinates
Week 3	20-Jan	24-Jan	M Martin Luther King Jr. Day W Applied Mathematics in Heat Transfer F Applied Mathematics in Heat Transfer	Week 11	16-Mar	20-Mar	M SoV in Spherical Coordinates W Numerical Methods F Numerical Methods
Week 4	27-Jan	31-Jan	M Thermal Boundary Conditions W Solutions of 1-D Heat Conduction Problems F Solutions of 1-D Heat Conduction Problems	Week 12	23-Mar	27-Mar	M Numerical Methods W Numerical Methods F Project 2
Week 5	3-Feb	7-Feb	M Solutions of 1-D Heat Conduction Problems W Resistance Networks F Resistance Networks	Week 13	30-Mar	3-Apr	M Numerical Methods W Numerical Methods F Numerical Methods
Week 6	10-Feb	14-Feb	M Transient Heat Transfer W Transient Heat Transfer F Transient Heat Transfer	Week 14	6-Apr	10-Apr	M Introduction to Mass Transfer W Introduction to Mass Transfer F Introduction to Mass Transfer
Week 7	17-Feb	21-Feb	M Project 1 W Separation of Variables (SoV) in Rectangular Coordinates F SoV in Rectangular Coordinates	Week 15	13-Apr	17-Apr	M Introduction to Mass Transfer W Introduction to Mass Transfer F Introduction to Mass Transfer
Week 8	24-Feb	28-Feb	M SoV in Rectangular Coordinates W SoV in Rectangular Coordinates F SoV in Rectangular Coordinates	Week 16	20-Apr	24-Apr	M Introduction to Mass Transfer W Introduction to Mass Transfer 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 20% 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. 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
Homework Assignments and Projects	80%
Attendance	20%
TOTAL	100%

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 disability.ufl.edu/students/get-started (352 392 8565). 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/>.

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>.