

Applications of Life Cycle Assessment in Biological Engineering

ABE 4932 Section: 10188/26396

ABE 6933 Section: 10197/26399

Class Periods: MWF Period 3, 9:35 – 10:25 am

Location: Frazier Rogers Hall Rm. 211, and online via Zoom

Academic Term: Spring 2021

Instructors:

Dr. Ana Martin-Ryals

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Office Hours: MWF 10:30-11:30 am or by appointment. Office hours will be held online via Zoom.

Teaching Assistant:

Kelsey Vought

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Course Description

This is a special topics course that will explore the topic of life-cycle assessment (LCA) in relation to biological engineering design. The course will be project based with students working in teams to identify a current challenge within water-energy-food systems and develop an engineering solution to address this challenge. A key component of this course will be applying LCA as a tool for informing the design process and evaluating the environmental impacts of engineered products and processes. Through the course, students will be introduced to additional concepts including circular economy, mass and energy balances, and life-cycle costing. Students will examine these concepts through case studies and apply them in a team design project. (3 credits.)

Course Pre-Requisites

MAC1147 Precalculus Algebra and Trigonometry

Course Objectives

After completing this course students will be able to:

- Identify challenges and potential biological engineering solutions within the water-energy-food nexus
- Utilize a mass and energy balance approach to develop a life cycle inventory for a product or process
- Carry-out a life-cycle assessment for a product or process using the ISO14044 framework
- Conduct uncertainty and sensitivity analysis to identify key design parameters that affect the environmental and economic impact of a product or process

Materials and Supply Fees

N/A

Required Textbooks and Software

There is no required textbook for this course. Access to all readings and course materials will be provided to students on Canvas. Students will be able to access the LCA software to be used in this course remotely via the ABE virtual workstation.

Course Schedule

<u>Week</u>	<u>Topic</u>	<u>Due</u>
1	Introductions, Class Overview, Grand Challenges	Assignment 1
2	Water-Energy-Food Nexus, Systems Thinking	Assignment 2
3	Sustainability Assessment and Circular Economy	Assignment 3
4	Life-cycle Assessment: Overview	Assignment 4
5	Life-cycle Assessment: Goal and Scope	Project Concept
6	Life-cycle Assessment: Life-cycle Inventory	Assignment 5
7	Life-cycle Assessment: Environmental Impact Assessment	Assignment 6
8	Life-cycle Costing	Assignment 7
9	Uncertainty and Sensitivity Analysis	Assignment 8
10	Presenting and Communicating Results	Assignment 9
11	Work on Projects	Project Proposal
12	Work on Projects	--
13	Work on Projects	--
14	Work on Projects	--
15	Project Presentations	--
16	Finals Week	Project Report

Attendance Policy, Class Expectations, and Make-Up Policy

- This course will utilize a [Team-Based Learning](#) approach. Therefore, attendance in class is very important. Attendance will be taken for each class session. You will achieve up to full credit for your performance with no more than 5 absences. With 6 to 10 absences you will receive the next lower grade. With 10 to 15 absences you will receive the second lower grade. 16 or more absences will result in an E grade for the course.
- Excused absences must be consistent with university policies in the undergraduate or graduate catalog and require appropriate documentation:
(<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>)
(<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>)
- Class meetings will be recorded. See the Online Course Recording Policy on the next page. Links to class recordings will be posted on the course Canvas site for students to refer back to and for students who are unable to attend live.
- All assignments/class deliverables are due by 11:59 pm on the day specified for full credit. 10% deduction/day thereafter. Maximum deduction is 50%.

Online Course Recording

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

F2F Course Policy in Response to COVID-19

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.
- Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.
- If you are experiencing COVID-19 symptoms ([Click here for guidance from the CDC on symptoms of coronavirus](#)), please use the UF Health screening system and follow the instructions on whether you are able to attend class. [Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms](#).
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. [Find more information in the university attendance policies](#).

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Assignments (9)	400	40%
TBL Assessments (10)	200	20%
Team Project	400	40%
	1000	100%

Grading Policy

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

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.ua.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.ua.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://sccr.dso.ufl.edu/policies/student-honor-code-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.

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:

- Robin Snyder, ABE Academic Advisor, 352-294-6709, rsnyder@ufl.edu
- 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](mailto:title-ix@ufl.edu), 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://care.dso.ufl.edu>.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.