

ECH4404L: Separation and Mass Transfer Operations Laboratory

Sections: 3528/4065

Class Periods: W/R Periods 2-5 (8:30am-12:35pm)

Location: CHE Unit Operations Lab (100, 200, 300), NRF

Academic Term: Spring 2022

Instructor:

Dr. LiLu Tian Funkenbusch

lilu.funkenbusch@ufl.edu

Office Hours: *Virtual Only* Zoom link [here](#) Tuesday 8-10 am or by appointment (Use Calendly to book, link on Canvas front page)

*You may call me Prof./Dr. Funkenbusch, or LiLu. Remember that calling your instructors by their first names must encompass the same level of professionalism and respect as using professional titles. Please do not call me Ms. or Mrs. Funkenbusch.

Lab Assistants:

Please contact through the Canvas website

	Wednesday	Thursday
BD	Garrett Kost	Sophia Kvachneva
CD	Patty Concepcion	Hanqin Zhao
CT	Blake Trusty	Jason Kantorow
LLE	Alex Harrison	Patty Concepcion
SM1	Calvin Rogowski	Calvin Rogowski
SM2	Fernando Davalos	Fernando Davalos

Course Description: Laboratory work in unit operations involving separation and mass transfer; 2 credit hours.

Course Pre-Requisites / Co-Requisites: ECH 4403 (Separation Processes), ECH 4424L (Unit Ops Lab I), ECH 4714L (Safety and Experimental Evaluation)

Course Objectives

1. Reinforce classroom theory by the collection and use of data in practical experiments with all their inherent problems and limitations.
2. Gain proficiency in writing technical reports.
3. Gain experience working in teams.
4. Create a sense of professional responsibility for the quality and integrity of engineering work.
5. Learn safe working procedures.
6. Learn equipment, instrumentation, and procedures not covered in lectures.

Materials and Supply Fees: Lab Fee: \$270.34

Required Textbooks and Software: none

Recommended Materials

- Geankoplis, C. J., Transport Processes and Unit Operations [On reserve, Science Library].
- Incropera, F. P. and D. P. DeWitt, Fundamentals of Heat and Mass Transfer [On reserve, Science Library]
- McCabe, W. L., J. C. Smith, and P. Harriet, Unit Operations of Chemical Engineering [On reserve, Science Library]
- Perry, R. H., D. W. Green, and J. O. Maloney, Perry's Chemical Engineers' Handbook [E-book available through UF Library website]

E-Learning:

Separation And Mass Transfer Operations Laboratory, ECH4404L
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The Canvas website (<http://elearning.ufl.edu/>) has all relevant documents and will be used for submission of reports and posting of grades and announcements.

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	Low
3. An ability to communicate effectively with a range of audiences	High
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	High
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	Medium
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	High
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	High

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Course Schedule

The course consists of the following six experimental modules:

- BD: Batch Distillation (3 memos)
- CD: Continuous Distillation (3 memos)
- CT: Cooling Tower (2 memos + 1 set of calculations)
- LLE: Liquid-Liquid Extraction (2 memos + 1 set of calculations)
- Semiconductors 1: (2 pre-lab homework and 2 post-lab reports)
 - A-Oxide Growth
 - B-Photolithography
- Semiconductors 2: (2 pre-lab homework and 2 post-lab reports)
 - A- Wet and Dry Etching
 - B- Thermal Evaporation

Each module is two weeks long. Each course section is divided into teams, which rotate through all modules except for continuous distillation, which will be done by all groups at the same time. **Each team member is responsible for understanding all elements of each experiment.** I suggest you divide the workload and rotate who is responsible for what. Evidence that a group member is not contributing equally will result in grade penalties. *See Canvas page for group assignments and detailed schedule.

The planned weekly schedule is shown on the Canvas page but is subject to change.

Attendance Policy, Class Expectations, and Make-Up Policy

- **Students are required to attend all lab sessions.**
 - Excused absences must be consistent with university policies (see below link) and require appropriate documentation.
 - **You must inform me by 10am on the day of the absence.** Failure to do so will result in the absence remaining unexcused.
- **Unexcused absences and tardiness will result in a grade reduction**
 - One unexcused absence will result in 10% total grade reduction.
 - Two unexcused absences will result in failure of the course.
 - More than two instances of tardiness will result in 5% total grade reduction per instance.
- **Both unexcused and excused absences require a make-up session.**
 - This can be done either by joining another group on a different day (i.e. showing up on Thursday if you're a Wednesday student) or scheduling a make-up lab with other students who missed the same experiment during the last week of the semester.
 - This is so that every student can perform every experiment and **will not remove any grade penalties associated with the absence.**

While this may seem strict, please remember that there are only 12 lab sessions (not including the first day). Missing one or two days means that you miss a large percentage of the course content. Being late or absent also hurts your teammates, who will have to do extra work during lab and spend more time filling you in later.

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	Worth
Module (x6)	150 pts each
Participation*	100 pts
Total	1000 pts

*Participation grade is based on peer evaluations and lab assistant/instructor assessments.

BD, CD	Worth
1st Memo	30 pts
Quiz	15 pts
2nd Memo	45 pts
3rd Memo	60 pts

CT, LLE	Worth
1st Memo	30 pts
Quiz	15 pts
Calculations	30 pts
2nd Memo	75 pts

SM	Worth
Pre-Lab A	25 pts
Post-Lab A	50 pts
Pre-Lab B	25 pts
Post-Lab B	50 pts

*Peer evaluations can have an impact on your grade. CATME gives out an “adjustment factor” which will be applied to your score for a module. For example, if you earn 140 points (out of 150 possible points) and an adjustment factor of 0.95, you will earn 133 points (0.95×140 points). Note that it is possible to earn an adjustment factor slightly greater than 1 or significantly less than 1 (I believe 0.3 is the lowest possible score).

Safety

Students are expected to know and follow safe operating procedures of the equipment as well as proper handling of hazardous materials. Students are required to attend a safety session at the beginning of the semester. **Failure to follow safe operating procedures will result in a significant grade reduction.** Examples of safety violations are listed below (this list is not exhaustive):

Safety violation	Penalty
Leaving the lab without shutting down an experimental system	Failing grade
Not wearing PPE required by an experiment	Letter grade reduction
Not disposing of hazardous waste properly	Letter grade reduction
Not handling a chemical spill properly	Letter grade reduction
Bringing food or drink into the lab	Letter grade reduction

The safety quiz on Day 1 of an experiment will be used to test preparedness prior to the first day of lab.

Memo Policy

- All memos should be completed as a group. These should be submitted via Canvas as a Word or PDF file.
 - a. 1st Memo: Due midnight two days before the 1st run day
 - b. 2nd Memo/Calculations: Due midnight two days before the 2nd run day
 - c. 3rd Memo/2nd Memo: Due midnight two days before the “3rd run day” (next experiment’s 1st run day)
- **A failing grade for that lab will be assigned to groups who do not submit a first memo.**
- Late submissions will be accepted only if a group was not able to complete the assignment on time due to an acceptable reason (see the attendance policy).

Pre- and post-lab Homework Policy

- Pre-lab reports should be completed individually by each student and are due by midnight two days before each new experiment. Pre-lab reports should be submitted via Canvas as a Word or PDF file, as well as Excel or other supporting documents.
- Post-lab reports should be completed individually by each student and are due by midnight two days before the next experiment. Post-lab reports should be submitted via Canvas as a Word or PDF file, as well as Excel or other supporting documents.
- Late submissions will be accepted only if a student was not able to complete the homework on time due to an acceptable reason (see the attendance policy).

Quiz Policy

- Quizzes are scheduled on Canvas for two days before Day 2 of an experiment. They will be available for a 24-hour window starting at midnight and ending at 11:59pm of that day.
- Quizzes will be rescheduled only for those students who cannot take them due to an acceptable reason (see the attendance policy). The student should notify the instructor about the situation as soon as possible to allow adequate time to find an alternative time.
- Students may use notes, manuals, or any other material during the quizzes.
- Students may **not** communicate with anyone else during the quizzes. Evidence of communication will result in a zero on the quiz and an Academic Honesty report.

Grading Policy

Percent	Grade	Grade Points
94.0 – 100.0	A	4.00
90.0 – 93.9	A-	3.67
87.0 – 89.9	B+	3.33
84.0 – 86.9	B	3.00
80.0 – 83.9	B-	2.67
77.0 – 79.9	C+	2.33
74.0 – 76.9	C	2.00
70.0 – 73.9	C-	1.67
67.0 – 69.9	D+	1.33
64.0 – 66.9	D	1.00
60.0 – 63.9	D-	0.67
0.0 – 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>

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 lab 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. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Cooperation Policy

- Students are expected to work in teams on their experiments and memos.
- Individual assignments, such as pre-labs and post-labs, should be completed by each student individually.
- No consultation among students is allowed during quizzes.

Plagiarism

Students are not permitted to represent as their own work any portion of the work of another person. Plagiarism includes (but is not limited to) submitting a document or assignment which in whole or in part is identical or substantially identical to a document or assignment not authored by the student. All sources used in preparation of the reports should be cited, including the manuals provided on the Canvas webpage. Failure to do so is considered plagiarism.

Note: Self-plagiarism is also an issue and will be punished as if the student plagiarized someone else’s work. You must cite any figures or information taken from other reports. This is the academic standard and is largely due to journal copyright issues when publishing papers.

Falsification of Information

Students are not permitted to use or report any invented or fabricated information or data. This includes both experimental results and theoretical calculations.

Sanctions for Violations of Honor Code

Since ethical behavior in science and engineering is equal in importance to specific knowledge, the instructor will assign a non-passing letter grade to students who violate academic honesty standards, regardless of the violator’s grade performance in 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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@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.

Writing Requirement

This course confers 6000 words towards the Writing Requirement (WR), which ensures students both maintain their fluency in writing and use writing as a tool to facilitate learning. While helping students meet the broad learning outcomes of content, communication, and critical thinking, the instructor will evaluate and provide feedback on students' written assignments with respect to grammar, punctuation, clarity, coherence, and organization.

Course grades have two components. To receive Writing Requirement credit, a student must receive a grade of C or higher and a satisfactory completion of the writing component of the course.

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/>.

COVID-19

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

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://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>.