Management of Unit Operations

(UOM)

ECH 4905/6905 Sections: 1997, MUO1, 08G9

Class meeting times: Mon (3:00 – 3:50 pm)
Sat (11:45 am – 12:35 pm)
Location: FLI 0109
Academic Term: Fall 2021

Instructor: *Dr. Fernando Mérida*
- e-mail: fmerida@ufl.edu
- Zoom Office hours: TBD
- You can call me Prof./Dr. Mérida, or "Fernando" if you feel comfortable by doing it so.

Co-Instructor: *Dr. LiLu Tian Funkenbusch*
- e-mail: lilu.funkenbusch@ufl.edu
- Office hours: By appointment
- Please call me Prof./Dr. Funkenbusch or LiLu. Please do not call me Ms. Or Mrs. Funkenbusch

Course platform and meeting information:
This course is scheduled to be face-to-face (F2F) for this term. Additionally, a simultaneous Zoom meeting will be available for students who are unable to attend the in-person class for various reasons. Zoom meetings will require the use of audio and video. Please check the section Student Privacy regarding recorded materials.

Contacting course instructors:
- E-mail is the preferred communication platforms. Please make sure the subject line of your e-mail message has the label "UOM - Question". You should expect a response within 48 hours (M-F) and within 72 hours (weekend).
- Normally, we have an "open door" policy where you can stop by during office hours. This semester, however, physical office hours will not be taking place for the foreseeable future. You can still arrange Zoom meetings outside of regularly scheduled office hours, please just email us to set up a time.
- Announcements will be periodically posted on Canvas. All students must signed-up to receive notifications Canvas notifications.

Course Description
(1 - 3 credits) Supervised teaching and management of the Unit Operations Laboratory. Students taking this course will guide experiments of small groups of students, troubleshoot equipment problems, and perform a detailed analysis of the lab experiments.

Course Pre-Requisites
Undergraduate students: ECH 4424L (Unit Ops Lab I) and/or ECH4404L (Unit Ops Lab II)
Graduate students: No pre-requisite.

Course Objectives
1. Ensure that students taking Unit Ops 1 and 2 have a good understanding of the experiment prior to beginning the lab
    a. Review (but do not grade) progress reports, calculations, and preliminary analysis with the students.
2. Supervise students as they conduct experiments including lab safety, theory, operating procedures, and troubleshooting
    a. 1 Credit: 1 lab session per week
    b. 2 Credits: 1 lab session per week plus a technical project
    c. 3 Credits: 2 lab sessions per week
3. Guide students to think and communicate as engineers
4. Participate in weekly meetings with the lab instructors, lab engineer, and other peer tutors
5. Work with the Unit Ops instructors and the Lab Engineer

a. Improve experiments
b. Troubleshoot technical problems
c. Assess safety
d. Revise SOPs and other documents

Professional Component (ABET):

The students taking this course will gain in-depth understanding of equipment used in Unit Operations of Chemical Engineering while reinforcing knowledge of safe operating procedures. In addition, the course provides opportunities to learn how to apply the fundamentals of Chemical Engineering to real-world systems while enhancing communication skills. Students will gain significant experience by leading a team and overall, teaching experience in a lab-based class.

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 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	Low
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	High
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	Medium

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

Course websites

- ***Canvas website: http://elearning.ufl.edu/***
  Canvas will be used as the main repository of information and other resources for the supervision of experiments, assignment preparation, safety guidelines, etc. It will also be used for submission of participation, posting of grades, announcements, and general information for the class.

Recommended Literature:

There is no required textbook for this class. The following titles are recommended to support fundamentals and theoretical background, physical constants, empirical correlations, and other concepts:

1. Geankoplis, C. J., *Transport Processes and Unit Operations* [On reserve in the Science Library].
2. Incropera, F. P. and D. P. DeWit, *Fundamentals of Heat and Mass Transfer* [On reserve in the Science Library]
3. Gerhart, Philip M., Gerhart, Andrew L., and Hochstein, John I, *Munson's Fluid Mechanics* [On reserve in the Science Library]

4. McCabe, W. L., J. C. Smith, and P. Harriet, *Unit Operations of Chemical Engineering* [On reserve in the Science Library]
5. Perry, R. H., D. W. Green, and J. O. Maloney, *Perry's Chemical Engineers' Handbook* [E-book is available through UF Library website]

Experimental modules* to be taught in Unit Ops I and II, and nomenclature:

Unit Operations 1 (UO1)	Unit Operations 2 (UO2)
1. Thin Film Evaporator (TFE) 2. Fluid Flow (FLU) 3. Flow Characteristic Curves (CUR) 4. Filtration (FIL) 5. Heat Exchangers (HEX) 6. Fixed and Fluidized Bed Columns (BED)	1. Batch Distillation (BD) 2. Continuous Distillation (CD) 3. Cooling Tower (CT) 4. Liquid-Liquid Extraction (LLE) 5. Semiconductor Module 1 (SM1) o Oxide Growth (SM1A) o Thermal Evaporation (SM1B) 6. Semiconductor Module 2 (SM2) o Photolithography (SM2A) o Wet & Dry Etching (SM2B)

* Both UO1 and UO2 have a 2-week module rotation

Course schedule

The course schedule is summarized below. Modifications to the schedule might be required depending on the progress of experiments which could be affected by performance of equipment/instrumentation, class cancellation due to atmospheric phenomena (e.g. hurricane season), or other reasons not listed in this document. Announcements will be posted in Canvas regarding any modification of the course schedule.

Course schedule for ECH 4905/6905

Semester Week	Dates	Meeting Plan*	Assignments due this day/week*
1	Aug 23rd	• Introduction & Class Info • Overview of UO1 and UO2 schedule • Syllabus/grading policy review	• Experiment training (during the week). *Unsatisfactory performance will lead to a grade penalty and a repeat session.
2	Aug 30th	• Basic routine in experiments • Safety & Emergency procedures • Instructions for discussion of Progress Reports/Memos	• Submission of EH&S and FERPA trainings • Safety homework
3	Sept 6th	*Labor Day; no class.*	• UO1 PTs: PR Rubric (Rotation 1)
4	Sep 13th	• Troubleshooting scenarios I • Review of proper pipette use	• Student evaluations (Rotation 1)
5	Sep 20th	• Confidence and authority while teaching	• UO1 PTs: PR Rubric (Rotation 2)
6	Sep 27th	• Troubleshooting scenarios II	• Student evaluations (Rotation 2) • Homework on confidence & authority
7	Oct 4th	• Internship/Co-Op experiences and applicability to experiment instruction	• UO1 PTs: PR Rubric (Rotation 3)
8	Oct 11th	• Lab Manual review: Theory	• Student evaluations (Rotation 3)
9	Oct 18th	• Lab Manual review: Config and SOPs	• UO1 PTs: PR Rubric (Rotation 4) • Theory edits
10	Oct 25th	• Mock report grading	• Student evaluations (Rotation 4) • Config and SOP edits
11	Nov 1st	• Go over graded lab reports • Guidelines for experiments during AIChE Annual Meeting	• UO1 PTs: PR Rubric (Rotation 5) • Graded lab report
12	Nov 8th	*AIChE Annual Meeting (Class TBD)*	• Student evaluations (Rotation 5)
13	Nov 15th	• Schedule for make-up labs • Suggestions for next semester	• UO1 PTs: PR Rubric (Rotation 6)
14	Nov 22nd	*Thanksgiving week (class to TBD)*	• Student evaluations (Rotation 6)
15	Nov 29th	• Term Project Presentations • Wrap-up	• Finding/training future peer-tutors • Make up sessions

** In addition to topics listed in the Meeting Plan, we will also discuss any issues encountered in the lab during every meeting.*

Term Project Schedule (for students with 2-credits)

Semester week	Date	Details
3	Sep 6th	Project topics announced
4	Sep 13th	The student will meet with lab instructors to discuss the assigned project
6	Sep 27th	Short proposal for the project, including the scope of the project, a preliminary timeline, possible resources from literature, and possible obstacles
10	Oct 25th	Short progress report on the project, including completed work and a timeline/update on any remaining goals
13	Nov 15th	Final report draft
16	Dec 6th	Final report is submitted

Guidelines for Assignments

1. Guidelines and grading rubrics are posted on Canvas.
2. Any written assignments should be written using complete sentences, with correct spelling and grammar. All symbols should be defined on their first use. Clarity and brevity will be rewarded; sloppy thinking and writing will be penalized.
3. All assignments, reports, forms, and evaluations should be submitted via Canvas either in Word or PDF format. No need to submit hard copies.
4. **Late submissions will be penalized by a 10% grade reduction for each day the assignment is overdue.**

Online Course Recording
Our class sessions may be audio and visually recorded as a resource for students in the class, and for enrolled students who are unable to attend live. Students who participate with their camera on, 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.

Attendance Policy, Class Expectations, Tardiness, and Make-Up Policy

- Peer Tutors are required to attend all tutored experimental sessions.

- 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.
- Students must let the course instructor know as soon as possible so we can plan for someone else to cover your session. Arrangements between peer-tutors in other sections are possible, but they must be discussed with the course instructor.
- Tardiness will result in a grade reduction (unless there is a valid excuse and they are notified to the course instructor). A first tardiness will result in a "warning" for the student. After a 2nd tardiness, one grade of final score will be reduced, a 3rd tardiness an additional grade of final score will be reduced. A 4th tardiness will result in failure in the class.

Evaluation of Grades
The grade in the class will be determined according to the following weighting criteria

Teaching Only

Assignment	% Final Grade
Safety	2.5%
Confidence/Authority	2.5%
PR Evaluation Rubrics (6)	20%
Experimental trainings (1)	15%
Completion of Student Evaluations (6)	20%
Edited Theory and Config/SOP (2)	30%
Graded old report	10%
Final Grade	100%

Teaching + Term Project

Assignment	% Final Grade
Safety	2.5%
Confidence/Authority	2.5%
PR Evaluation Rubrics (6)	10%
Experimental trainings (1)	15%
Completion of Student Participation Forms (4)	10%
Edited Theory and Config/SOP (2)	15%
Graded old report	5%
Term Project	
• Project Proposal	5%
• Progress Report	10%
• First Draft of Full Report	10%
• Final Draft of Full Report	15%
Final Grade	100%

Important: Grades for assignments and class activities as described in tables above will be posted in Canvas. However, the final grade will be computed outside Canvas to avoid incorrect weighing frequently observed in Canvas gradebooks.

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

Safety

Peer-tutors are expected to know and follow safe operating procedures of equipment, devices, and materials used in experiments, as well as proper handling of hazardous materials. The students are required to complete the safety homework at the beginning of the semester. **Failure to follow safety guidelines during experiments will lead to significant grade reductions.** Examples of safety violations are listed below (this list is not exhaustive).

Examples of safety violations

Safety violation	Penalty
Leaving the lab without proper shutting down	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
Causing a major spill due to negligence	Letter grade reduction
Eating or drinking inside the classroom	Letter grade reduction
Using non-intrinsically safe/non-explosion proof electronic devices in areas restricting the use of electronics	Letter grade reduction

As a peer-tutor, you are responsible for your group's safety. It is expected that peer-tutors create a safe work culture and environment. Safety violations will affect the grades of the group and that of the peer-tutor.

Peer-tutor Evaluations

Students of Unit Ops classes will evaluate the performance of peer-tutors at the end of each module. These evaluations will be anonymous and submitted via Canvas to the course instructor. Subsequently, the course instructor will compile and process these evaluations and will send it to peer-tutors upon request. Even though the ratings/evaluations provided by students to peer-tutors are not part of the grade, peer-tutors are expected to demonstrate responsibility and professionalism during their teaching activities, keeping and fostering a respectful environment, and avoiding biased behaviors. Grade reductions can be applied in case of overall poor performance by the peer-tutor.

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 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://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.

Cooperation Policy

- Students are expected to work in teams on their experiments and memos.
- Pre-lab and post-lab homework should be answered 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.**

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
- 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, Online Course Recording, and Video/Image Sharing

- 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.

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.