

Management of Unit Operations

(UOM)
ECH 6905

Section: 2574

Class periods: To arrange (one period per week)

Location: TBA

Academic Term: Spring 2022

Instructor: Dr. Fernando Mérida

- e-mail: fmerida@ufl.edu
- Zoom Office hours: M, 9:00 – 10:00 AM or by appointment
Zoom link and instructions to arrange office hours will be available in Canvas.
- 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
- Zoom Office hours: T, 8:00 – 10:00 AM or by appointment.
Zoom link and instructions to arrange office hours will be available in Canvas
- Please call me Prof./Dr. Funkenbusch or LiLu. Please do not call me Ms. or Mrs. Funkenbusch

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).
- Announcements will be periodically posted on Canvas. All students must signed-up to receive notifications Canvas notifications.

Course Description

(3 credits) Student (Lab Assistants) instruction and management of the Chemical Engineering Unit Operations Laboratory for undergraduate students. Students taking this course will guide experiments of small groups of students, troubleshoot equipment problems, and perform a detailed analysis of the lab experiments. Additionally, students will attend a weekly meeting (one period) to discuss progress of experiments, teaching skills, management topics, and laboratory safety.

Course platform and meeting information:

This course is scheduled to be face-to-face (F2F) for this term. A simultaneous Zoom meeting may 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.

Course Pre-Requisites

N/A

Course Objectives

This course will introduce students to supervision and management of pilot-plant scale unit operations typical within the chemical industry. The goal is to provide students with the fundamental understanding of their operating principles and provide students with management skills to direct their operation. By the end of this course and depending on the number of credits registered, students will be able to:

- Have a good understanding of both the fundamentals and technical operating principles of the operation of the assigned experiment;
- Provide undergraduate students taking either of the Unit Operation Labs (ECH4224L or ECH4404L) with a good understanding of the operating principles prior to conducting the experiment;
- Supervise undergraduate students as they conduct experiments helping students conduct the experiments safely and troubleshooting when problems arise;

- Review progress reports, calculations, and preliminary analysis with the undergraduate students to help guide the students on experimental and analysis;
- Guide undergraduate students to think and communicate as engineers;
- Conduct a term project dealing with experiment improvements, in-depth analyses of experiments, identification of new experiments, assessment of experimental techniques, etc.;
- Participate in weekly meetings with the lab instructors, lab engineer, and other lab assistants with the objectives of improving the experiments, troubleshooting technical problems, assessing safety issues, and revising standard operating procedures (SOPs) and other technical documents.

Materials and Supply Fees

N/A

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 posting of grades, announcements, and general information for the class.

Required Textbooks and Software

There is no required textbook for this 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]

Table 2 - Experimental modules* to be taught in Unit Ops I and II, and nomenclature:

Unit Operations 1 (UO1)	Unit Operations 2 (UO2)
<ol style="list-style-type: none"> 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) 	<ol style="list-style-type: none"> 1. Batch Distillation (BD) 2. Continuous Distillation (CD) 3. Cooling Tower (CT) 4. Liquid-Liquid Extraction (LLE) 5. Semiconductor Module 1 (SM1) <ul style="list-style-type: none"> ○ Oxide Growth (SM1A) ○ Thermal Evaporation (SM1B) 6. Semiconductor Module 2 (SM2) <ul style="list-style-type: none"> ○ Photolithography (SM2A) ○ 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.

Table 3 - Course and assignment schedule*

Semester Week	Dates	Meeting Plan [†]	Assignments due this day/week*
1	Jan 10 - 17	<ul style="list-style-type: none"> • Introduction, class info, and policies • Overview of UO1 and UO2 schedule • Safety I 	<ul style="list-style-type: none"> • Complete experimental trainings (Unsatisfactory performance will lead to a grade penalty and a repeat session)
2	Jan 17 - 21	<ul style="list-style-type: none"> • Basic routines in experiments • Instructions for discussion evaluations of Progress Reports, memos, etc. 	<ul style="list-style-type: none"> • Completion of EH&S and FERPA trainings • Safety homework (HW-1)
3	Jan 24 - 28	<ul style="list-style-type: none"> • Safety II & emergency procedures • Review of proper pipette use 	<ul style="list-style-type: none"> • UO1 PTs: PR Rubric^{††} (Rotation 1)
4	Jan 21 - Feb 4	<ul style="list-style-type: none"> • Troubleshooting scenarios 	<ul style="list-style-type: none"> • Student evaluations (Rotation 1)
5	Feb 7 - 11	<ul style="list-style-type: none"> • Confidence and authority 	<ul style="list-style-type: none"> • UO1 PTs: PR Rubric (Rotation 2) • Confidence & authority homework (HW-2)
6	Feb 14 - 18	<ul style="list-style-type: none"> • Internship/Co-Op experiences and applicability to experiment instruction 	<ul style="list-style-type: none"> • Student evaluations (Rotation 2)
7	Feb 21 - 25	<ul style="list-style-type: none"> • Lab Manual review: Theory 	<ul style="list-style-type: none"> • UO1 PTs: PR Rubric (Rotation 3) • Theory edits homework (HW-3)
8	Feb 28 - Mar 4	<ul style="list-style-type: none"> • Lab Manual review: Config and SOPs 	<ul style="list-style-type: none"> • Student evaluations (Rotation 3) • Config and SOP edits homework (HW-4)
9	Mar 7 - 11	<i>Spring Break; no classes.</i>	<ul style="list-style-type: none"> • UO1 PTs: PR Rubric (Rotation 4)
10	Mar 14 - 18	<ul style="list-style-type: none"> • Professional communication 	<ul style="list-style-type: none"> • Student evaluations (Rotation 4)
11	Mar 21 - 25	<ul style="list-style-type: none"> • Mock report grading 	<ul style="list-style-type: none"> • UO1 PTs: PR Rubric (Rotation 5) • Suggested peer-tutor homework (HW-5)
12	Mar 28 - Apr 1	<ul style="list-style-type: none"> • Management wrap-up 	<ul style="list-style-type: none"> • Student evaluations (Rotation 5)
13	Apr 4 - 8	<ul style="list-style-type: none"> • Suggestions for future semesters 	<ul style="list-style-type: none"> • UO1 PTs: PR Rubric (Rotation 6)
14	Apr 11 - 15	<ul style="list-style-type: none"> • Term Project Presentations 	<ul style="list-style-type: none"> • Student evaluations (Rotation 6) • Training of new peer-tutors (HW-6)

* This schedule is subject to change. Canvas announcements will be posted by course instructors in case modifications to this schedule are required.

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

^{††} Submission of PR Eval Rubrics are required for UO1 lab assistants only

Please note the following guidelines regarding 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 (unless otherwise stated).

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

- Attendance and course assignments are dictated by the credits registered (3 credits) which involves the supervision of two lab sessions per week (two different days, and two different experiments)
- Lab assistants are required to attend all tutored experimental sessions as well as weekly meetings.
- 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 lab assistants 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:

Table 4 – Grade distribution

Assignment	% Final Grade
Experimental Training	10%
EH&S, FERPA, and LATCH Assessment	10%
PR Evaluation Rubrics (6)	25%
Student Evaluations (6)	25%
Homework [†] (6)	30%
Final Grade	100%

[†]See Table 3 for details on Homework (HW-1 – HW-6)

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

Lab assistants 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

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

Lab Assistant Evaluations

Students of Unit Ops classes will evaluate the performance of lab assistants 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 lab assistants are not part of the grade, lab assistants 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 lab assistant.

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/>.

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.

Video recordings will be available upon approval by the course instructor only, and it will require the use of an intrinsically safety camera whenever the video recording is to be made on rooms 100, 200, and 300 of the Unit Operations Lab.

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/>.

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.

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>.

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- 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.