

Fluid and Energy Transfer Operations Laboratory

(Unit Operations Lab 1)

ECH 4224L

- **Sections, Days, and Class Periods:**
 - 3535 – Monday – periods 2 – 5 (8:30 am – 12:35 pm)
 - 2449 – Tuesday – periods 2 – 5 (8:30 am – 12:35 pm)
 - FETL – Thursday – periods 6 – 9 (12:55 am – 4:55 pm)
- **Locations:** Unit Operations Lab (CHE 100, 200, 300), CHE 220, and NSB 304, 312, 312A, 312B
- **Academic Term:** Spring 2025

Instructor:

Dr. Fernando Mérida

You can call me Prof./Dr. Mérida, or Fernando if you feel comfortable. Remember that calling instructors by their names must encompass the same level of professionalism and respect as using professional titles.

- **e-mail:** fmerida@ufl.edu
- **Office Phone Number:** (352) 294-7504
- **Office Hours:** Tuesdays 3:00 - 4:30 pm and Fridays 11:00 am – 12:30 pm via [Zoom](#)
 - You must reserve a 15-minute slot for office hours. Please use this [Google Calendar](#) to book your slot.
 - Office hours can be either individual or group. If you have consultations that may benefit other teammates, coming to office hours as a group is strongly encouraged.
 - When booking your slot please delete the information shown in the "What" field and replace it by the following: *your name & last name, section & team#, and a few words describing what you want to discuss during office hours.* An example is available under the "description" field in the Google calendar.

Communications with and from Dr. Mérida:

- E-mail is my ONLY communication platform. Please do NOT message via Canvas messages.
- Subject Line: make sure the subject line of your message has this generic label: **U01 -Day#- Question** Here, "Day#" refers to the day (use the first three letters) you're enrolled in the course and your team number. "Question" must be replaced by a couple of words describing your question or consultation.
 - Example: *U01-Tue#3- FLU error bars* can be the subject line for a question dealing with the calculation of error bars for a student enrolled in team # 3 of the Tuesday section, who is currently analyzing data from the fluid flow module.
- Response Time: you should expect a response within 48 hours (M-F) and within 72 hours (weekends). Failure to use the subject line above indicated will lead to delayed responses.
- Canvas Announcements: they will be periodically posted on Canvas. All students configure their Canvas profiles in order to get Canvas notifications during the term.

Peer Tutors:

- Please use *peer tutor* (or just "tutor") for lab assistants that will supervise the execution of experiments. Avoid calling them "TA" since not all of them are teaching assistants.
- You may contact peer tutors through Canvas messages or via e-mail (see Table 1 on page 2). Modifications to the list of peer tutors and their assigned experiments may be required. Canvas announcements will be posted if this happens.

Lab Staff:

- Lab Engineer: Mr. Preston Towns, ptowns@che.ufl.edu (Office: CHE 118)
- Lab Director and Unit Ops 2 course instructor: Dr. LiLu Funkenbusch, lilu.funkenbusch@ufl.edu (Office: CHE 219)

Table 1. Peer tutors for Unit Ops 1

Module	Monday	Tuesday	Thursday
MEB (Material & Energy Balances)	Carlos Orosco carlos.orosco@ufl.edu Thomas "TJ" Scott t.scott1@ufl.edu	Colin Currin colin.currin@ufl.edu Daniel Jardon jardon.daniel@ufl.edu	Carlos Orosco carlos.orosco@ufl.edu Daniel Jardon jardon.daniel@ufl.edu
FLU (Fluid Flow)	Abbas Kothawala akothawala1@ufl.edu Luke Jackson lukejackson@ufl.edu	Daniel Jardon jardon.daniel@ufl.edu Carlos Orosco carlos.orosco@ufl.edu	Daniel Jardon jardon.daniel@ufl.edu Jasmeet Bhatt jasmeetbhatt@ufl.edu
SOL (Solid-Liquid Operations)	Thomas "TJ" Scott t.scott1@ufl.edu Deep Thakkar deep.thakkar@ufl.edu	Jasmeet Bhatt jasmeetbhatt@ufl.edu Deep Thakkar deep.thakkar@ufl.edu	Deep Thakkar deep.thakkar@ufl.edu Mei Adcox meiadcox@ufl.edu
TRA (Heat and Mass Transport)	<i>TBA</i>	<i>TBA</i>	<i>TBA</i>

Course Description

(2 credits) Experimental work in fundamentals of unit operations involving heat and momentum transfer.

Course Pre-Requisites

ECH 3101 (Process Thermodynamics), ECH 3203 (Fluid and Solid Operations), ECH 3223 (Energy Transfer Operations), ENC 3246 (Professional Communication for Engineers)

Course Co-Requisites

ECH 4714 (Chemical Process Safety)

Materials and Supply Fees: \$100.24

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 and/or oral presentations.
3. Gain experience in teamworking, time management, decision making, and troubleshooting
4. Create a sense of professional responsibility for the quality and integrity of engineering work.
5. Work safely thus promoting a safe environment for others.
6. Learn equipment, instrumentation, and procedures not covered in lecture courses.
7. Learn and apply basic concepts of statistical analysis and design of experiments whenever is possible.

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	
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:** <http://elearning.ufl.edu/>
Canvas will be used as the main repository of resources for preparation of experiments, submission of lab homework, projects, and other deliverables. It will also be used for the posting of grades, announcements, and general information for the class. Please note that due to the inability of Canvas to properly weigh assignments with bonus, final grades will be computed externally by the course instructor.
- **CATME**
This software will be used for two purposes: a) group formation during first week of the semester, and b) team evaluations. Additional instructions are available in Canvas.

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]

Course overview

The course consists of four experimental **modules** dealing with key concepts on fluid and energy transfer operations. Each module lasts for two weeks; this two-week period is called **rotation**. In each rotation, students will be performing different **experiments**. Each course section is divided into teams which will *rotate* through all four

modules. Any student switching sections or adding to the class during the add/drop week must notify the course instructor.

Student teams

- The number of members per team is planned to be four. However, a few teams might have 5 members depending on final enrollment at the end of the add/drop period
- Team formation will take place via CATME Team Maker Survey using algorithms according to instructor-determined criteria. This allows to optimize team composition thus making groups more heterogenous as well as having similar meeting times outside the class.
- **You must complete the CATME Team Maker survey by the date indicated in the Orientation Session during the first week of classes. Failure to complete this survey by the deadline will result on zero points in the relevant survey, and will put you on a random team whose time availability you must match.**
 - If you cannot attend the Orientation Meeting due to justifiable reasons or got enrolled in this course during the add/drop period (but after the Orientation Meeting), you must contact the course instructor as soon as possible.
- Each team will prepare and sign a team contract to define the team’s mission, overall goals, commitment, resources, boundaries, constraints, etc. Team contracts will be prepared and signed by each member of a team on the second week of classes.
- Each team member will have suggested *rotating* roles throughout the semester (e.g., leader, recorder, analyst, planner). Tasks associated to each role and strategies to monitor role effectiveness will be discussed in class.
- Team composition will be fixed at least for the first three rotations. There’s a possibility of changing team composition for the last rotation. If this happens, the course instructor will post announcements in a timely fashion.
- Regardless of individual contributions, each team member is responsible for understanding all elements of each experiment including theory, experimental design, system configuration, experimental protocol, etc. in the different modules.

Modules and Experiments

Each of the four modules may be subdivided into one or more experiments which will be conducted within the two-week period (rotation). Exceptions to the two-week duration in each rotation may exist for the last rotation, and they may be due to atmospheric events or unforeseen reasons. Teams will complete four rotations across the four modules throughout the semester. Names, nomenclature, and a brief description of experiments are listed below. Technical details and lab manuals for each module are available via Canvas.

Material and Energy Balances [†]	Fluid Flow [†]	Solid-Liquid Operations [‡]	Heat and Mass Transport [‡]
MEB	FLU	SOL	TRA
<ul style="list-style-type: none"> • Thin Film Evaporator (TFE) Investigation of vapor-liquid equilibria and material & energy balances in a continuous evaporation process • Heat Exchangers (HEX) Convective energy transfer and calculation of heat transfer coefficients in heat exchangers 	<ul style="list-style-type: none"> • Mini Fluid Flow (MFF) Investigation of friction losses and pressure drop assessment in a mini fluidic device under laminar flow • Pilot-scale Fluid Flow (PFF) Quantification of major and minor friction losses, use of flow meters, and analysis of split flow in a pilot-scale pipe network 	<ul style="list-style-type: none"> • Filtration (FIL) Analysis of a batch filtration (BF) process using Darcy’s Law to model and validate a rotary continuous filter (CF) • Fixed & Fluidized Beds (BED) Flow dynamics through solid fixed (FIX) and fluidized (FLZ) beds, and use of Ergun equation to model these processes 	<ul style="list-style-type: none"> • Tangential Flow Filtration (TFF) Cross-flow filtration of macromolecules • Chromatography (CRO) Size-exclusion separation of proteins • Molecular Diffusion (DIF) Liquid and Gas Diffusion • Heat Conduction (COND) Analysis of heat conducted linearly/ radially

† These modules involve the execution of TWO experiments per module in a given rotation. Two or more teams may be working on the same module, but the sequence of experiments in weeks 1 and 2 will be different.

‡ These modules involve the execution of ONE experiment only. Two or more teams may be working on the same module, but each team gets ONE experiment only in weeks 1 and 2.

Required Computer

Please refer to the UF student computing requirement (<https://news.it.ufl.edu/education/student-computing-requirements-for-uf/>).

- All modules will require using a laptop at some extent during the lab period to collect or analyze data, review preliminary calculations, and for literature review. Guidelines for the use of laptops and other electronics in the lab are given in the Safety section.
- It is recommended that you use a PC and **not a Mac**.

Proposed Course Schedule

The proposed schedule of course activities is summarized in Table 2 using the module nomenclature defined above for modules and experiments. Each module has different modalities (labeled with numbers) depending on the type and sequence of experiments. This is described in Table 3. **Modifications to the proposed schedule may be necessary** depending on the status of lab facilities, performance of equipment or instrumentation, class cancellation due to atmospheric phenomena, or other reasons not listed in this document. These modifications include (but not restricted to) the addition, removal, or expansion of modules and/or their experiments. Announcements will be posted on Canvas regarding any modification of the course schedule.

Table 2. Proposed course schedule for ECH4224L

Rotation	Week	Team 1	Team 2	Team 3	Team 4	Team 5
0	Jan 13 - 17	Orientation and Safety Session, and Lab Tour				
	Jan 20 - 24	Workshop on Data Analysis and Technical Writing				
	Jan 27 - 31	Prep Week: Module Overview and Hands-On Safety (Proposal A)				
1	Feb 3 - 7	MEB-1 [†]	FLU-1	FLU-2	SOL-1	SOL-2
	Feb 10 - 14					
2	Feb 17 - 21	FLU-1	SOL-2*	MEB-1	FLU-2	MEB-2
	Feb 24 - 28					
3	Mar 3 - 7	SOL-1	MEB-1	SOL-2	MEB-2	FLU-2
	Mar 10 - 14					
	Mar 17 - 21	SPRING BREAK - NO LABS				
4	Mar 24 - 28	Prep Week: Module Overview and Hands-On Safety (Proposal B)				
	Mar 31 - Apr 4	TRA-1**	TRA-2	TRA-3	TRA-4	TRA-5
	Apr 7 - 11					
	Apr 14 - 18	Report Preparation and Presentation Draft				
	Apr 21 - 23	Oral Presentations***				

† See Table 3 for the description of numbers according to module modalities and experiment timelines

* Thursday section gets SOL-1 instead of SOL-2

- ** Modalities 1 – 5 for this module (see Table 3) are subject to change depending on lab facilities and/or equipment performance
 *** Thursday section presentations may be rescheduled to April 23rd to avoid reading days

Table 3 - Module modalities and experiment timelines

MEB - Material & Energy Balances		
	MEB-1	MEB-2
Week 1	HEX	TFE
Week 2	TFE	HEX

HEX: Heat Exchangers
TFE: Thin Film Evaporator

FLU – Fluid Flow		
	FLU-1	FLU-2
Week 1	MFF	PFF
Week 2	PFF	MFF

MFF: Mini Fluid Flow
PFF: Pilot-scale Fluid Flow

SOL – Solid-Liquid Operations		
	SOL-1	SOL-2
Week 1	BF	FIX
Week 2	CF	FLZ

BF: Batch Filtration
CF: Continuous Filtration
FIX: Fixed Beds
FLZ: Fluidized Beds

TRA – Heat and Mass Transport					
	TRA-1	TRA-2	TRA-4	TRA-4	TRA-5
Week 1	CRO	TFF	LDIF	GDIF	COND
Week 2	CRO	TFF	GDIF	LDIF	COND

CRO: Chromatography
TFF: Tang. Flow Filtration
LDIF: Liquid Diffusion
GDIF: Gas Diffusion
COND: Heat Conduction

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

Attending ALL class activities (sessions, tours, workshops, experiments, presentations, etc.) indicated in table 2 is mandatory.

- **Excused absences:** In case of foreseeing an absence due to justifiable reasons (see below) the student must e-mail the course instructor (copying the peer tutor) at least two days before the missed class. Excused absences must be consistent with university policies in the undergraduate catalog and will require appropriate documentation.
 - Examples of excused absences include medical appointments and procedures, job interviews, attendance to conferences, and other related activities. For more information click here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>
 - In case of unexpected situations or other emergencies that cannot be planned ahead of time, the student must notify the course instructor, teammates, and peer tutor no later than 10:00 am the day of the corresponding class. Depending on the type of unexpected situation or emergency, and the appropriate documentation, the course instructor will determine whether it qualifies or not for excused absence. **Failure to notify the course instructor will result in unexcused absence** (see below for unexcused absences)
 - The course instructor might file a *UMatter WeCare* report in case the student does not notify the absence by 10 am in order to make sure that the student is safe.
 - All excused absences must be made-up. This will be coordinated between the course instructor and the student. Failure to make-up the class, even when the student notified with the appropriate

documentation (whenever it applies), will result on 5% reduction of the total grade obtained in the class.

- **Unexcused absences:** these are unplanned absences that cannot be justified with appropriate documentation. Examples include oversleeping, not hearing the morning alarm, or deliberately not wanting to attend the class. This list is not exhaustive and may include other examples.
 - One unexcused absence will result on 10% reduction of the total grade obtained in the class. In addition, the class must be made up. Make up logistics will be coordinated between the course instructor and the student. Failure to make up the missed class will result on an additional 5% reduction of the total grade obtained in the class.
 - A second unexcused absence will result in a failing grade (D) in the course (see *Evaluation of Grades*)
- **Tardiness:** students must be on time for all course activities (labs, lectures, workshops, presentations, etc.)
 - A first tardiness within the first 10 minutes after starting the class without appropriate notification to the course instructor and teammates will involve a “warning” and will only slightly affect participation grade. In case of an uncontrollable situation or emergency, the student must notify team members and course instructor as soon as possible before 10:00 am (see above for excused absences)
 - A second case of tardiness within the first 10 minutes after starting the class without appropriate notification will result on a 3% overall grade reduction in the course.
 - A third case of tardiness within the first 10 minutes after starting the class without appropriate notification to the course instructor and teammates will result in a failing grade (D) in the course (see *Evaluation of Grades*)
 - Any tardiness 10 minutes after starting the class and before 10:00 AM can be categorized as excused absence only if justifiable (see “Excused Absences”) and appropriate notification is sent to the course instructor before 10:00. Otherwise, tardiness will become an unexcused absence (see “Unexcused Absences”).
- **Make-up classes:** Any missed lab or class activity (excused or unexcused) must be made-up. Dates and logistics for make-up labs will be coordinated between the student and the course instructor. Keep in mind that making-up a lab will not remove any grade deduction or penalty associated with the absence as explained above.

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

Table 4. Grade distribution.

Assignment	Points	% Final Grade
Assessments (2) & Surveys (2); 5 & 10 points each	30	3%
Lab Proposals (2); 35 points each	70	7%
Pre-labs (4); 37.5 points each	150	15%
Progress Analysis (4); 50 points each	200	20%
Lab Memos (4); 100 points each	400	40%
Oral Presentation**	100	10%
Participation	50	5%
Total Points and Final Grade %	1000	100%

Important: Grades for individual and group assignments, and other class activities as described in Table 4 will be posted on Canvas. However, the final grade will be computed outside Canvas to avoid incorrect weighing frequently observed in Canvas gradebooks.

Homework, due dates, format, and policies:

Instructions to prepare all assignments are available on Canvas. Generic dates are specified below. For specific due dates, students must check the course schedule available in the Canvas Home Page along with other supporting information provided by the course instructor. Keep in mind that the course schedule might be subject to change due to class cancellation caused by uncontrollable scenarios (e.g., hurricane/tropical storm watch). Announcements will be posted on Canvas to inform people of any change to the course schedule.

- **ASSESSMENTS AND SURVEYS:** → *Format: Canvas or CATME surveys; individual.* Supporting materials assessments will be available via Canvas as well as discussed in lecture sessions and workshops.
 - O&S Assessment:** Canvas assessment open for 24 hours to assess the understanding of syllabus contents, topics discussed in the Orientation & Safety (O&S) session, and key points highlighted during lab tours. Unlimited attempts will be allowed until getting full credit.

DEADLINE: one day after attending the O&S Session (it varies depending on the section).
Opens: 12:00 AM (e.g., midnight) / Closes: 11:59 PM (e.g., ~ 24 hours later)
 - Welcome Survey:** Canvas survey with questions on personal and professional interests, previous research and industry experiences, current coursework, and other questions to foster community and to identify professional goals.

DEADLINE: Sunday, 01/19, 11:59 PM

- c) **CATME Team Maker Survey:** CATME survey for team formation via algorithms based on instructor-specified criteria, including time availability to work outside of the class. The completion of this survey will require the creation of an account in CATME (www.catme.org) Please check your spam folder in case you don't receive the email in your inbox. Note that upon indicating time availability in the survey, the percentage of daily "busy time" cannot surpass 60% as it's considered unreasonable. Otherwise, you will be contacted by the course instructor to review end edit time availability in the survey.

DEADLINE: Sunday, 01/19, 11:59 PM

- d) **DDT Assessment:** Canvas assessment open for 24 hours to assess the understanding of topics discussed in the workshop on **Data Analysis, Design of Experiments, and Technical Writing (DDT)**. Questions will also deal with the contents of supporting materials and literature resources. Unlimited attempts will be allowed until getting full credit.

DEADLINE: one day after attending workshop (it varies depending on the section).

Opens: 12:00 AM (e.g., midnight) / Closes: 11:59 PM (e.g., ~ 24 hours later)

- **LAB PROPOSALS:** → *Format: Typed [PDF]; Group.* After each of the two Prep Weeks, teams must work on a lab proposal featuring an overview of the lab work to be conducted in upcoming modules as well as laboratory safety plan. Components of lab proposals include overall goal, fundamental and/or alternative chemical engineering topics, required measurements, data analysis overview, and other. Specific guidelines and required sections are provided in Canvas.

- **Proposal A: MEB, FLU, SOL.** **DEADLINE: three days after the Lab Prep session (it varies depending on the section).**
- **Proposal B: TRA.** **DEADLINE: three days after the Lab Prep session (it varies depending on the section).**

- **PRE-LAB (PL):** *60% individual and 40% group; see below for format and due dates.*

- **Individual portion:** → *Format: Typed [PDF]; submitted via Canvas.* Before starting a new rotation, each student must work individually on questions and problems dealing with theory, governing equations, experimental procedures, and safety.

DEADLINE: the day before starting a new rotation (until 11:59 PM). *You will not be allowed to be in the lab if the assignment was not submitted on time.*

- **Group portion:** → *Format: Typed [PDF]; handwritten portions for selected sections (e.g., required calculations) are allowed only if reasonably legible.* Each team must sketch the proposed experimental design, analyze the workflow of calculations, and work on other group-related tasks in preparation for experiments. The *team planner* of the ongoing rotation (see team roles) must submit the file via Canvas and bring a printed copy of the group PL to the lab for discussion between the team and peer tutors and/or course instructor.

DEADLINE: the day a new rotation starts (until 7:30 AM). If the group portion of the PL is incomplete or not submitted via Canvas, the entire team will have zero credit and members will not be allowed to start experiments.

Materials required for the preparation of PLs (both individual and group portions) include lab manuals and experiment videos (if available), but may also require the use of textbooks, notes from former lecture courses, or technical and scientific literature including engineering journals or technical websites.

Late submissions will only be accepted if a student proves not being able to complete the homework on time due to a justifiable and documentable reason (see excused absences policy)

- **PROGRESS ANALYSIS (PA):** → *Format: Excel spreadsheet; group assignment submitted via Canvas.*

Each team will submit an Excel spreadsheet showcasing data analysis, calculations, preliminary results, and bullet point interpretations of data and results from Week 1. PA also requires the experimental plan and other prep work for Week 2. The *team analyst* of the ongoing rotation (see team roles) will submit one Excel file for the team, and the *team recorder* will bring their laptop with the Excel file for discussion at the beginning of Week 2.

DEADLINE: **the day** before Week 2 experiments start (until 11:59 PM).

Guidelines, key points, and rubrics are available in Canvas. PAs will be ‘presented’ by ALL team members to peer tutors and/or course instructor in Week 2. In lab PA discussions will require the Excel file submitted via Canvas. No edits allowed beyond that point.

Late submissions are not allowed.

- **LAB MEMOS (MEM) and FINAL REPORT (FR):** *Format: Typed; [PDF and Word] and an updated Excel spreadsheet; group assignment submitted via Canvas.*

Once ALL experiments of the module are finished, each team will prepare either a technical memorandum (MEM) or a final report (FR) containing the analysis of Weeks 1 and 2. MEMs will have a minimum and maximum of 4 and 6 pages, respectively (main body of the memo; 2 additional pages max for appendices) and FRs will have a minimum and maximum of 10 and 15 pages, respectively (main body of the report; 4 pages max for appendices). The *team leader* of the ongoing rotation (see team roles) will oversee the completion of the *Team Accountability* page and will submit the required files via Canvas.

DEADLINE: **one week** after finishing all experiments for the module (until 11:59 PM). For example, if you are in a Tuesday group, you’ll have until next Tuesday at 11:59 PM to submit your team’s MEM or FR

Guidelines, key points, and evaluation rubrics are available on Canvas. Late submissions will not be accepted unless they are consistent with the Late PR/MEM policy (see below).

“Freebies”- throughout the semester each team will have a maximum of two, “one-day late submission” (a.k.a. “freebies”) for MEM or FR. For example, if you are in a Tuesday group and because of a busy week you are unable to submit your FR or MEM by 11:59 the next Tuesday, you can still submit it the next day (e.g., Wednesday) at 11:59 PM without a grade penalty. Each group is encouraged to use freebies wisely. No additional late submissions will be accepted. Keep in mind the following:

- When using freebies, a short message must be included in the assignment submission (Canvas’ assignment comments) to briefly inform the course instructor the reasons behind the use of a freebie.
- Freebies are not cumulative. This means that you cannot accumulate freebies to have a “two-day extended deadline”.

- **ORAL PRESENTATION:** → *Format: Typed; group assignment. PowerPoint slideshow and Excel file containing all calculations. Oral presentation delivered in-person by all team members.*

In addition to a MEM or FR, the last rotation will require a group presentation to discuss the experimental work and most important results of the module. Additional presentation topics connecting the obtained results to lifelong impact will be required. Presentations will be delivered either during class time or during the final exam time if necessary. The *team leader* of the ongoing rotation (see team roles) will oversee the completion of the *Team Accountability* slide and will submit the required files via Canvas.

DEADLINE: **Week of April 21 – 23 (it varies depending on the section).** Files must be submitted on or before the day the presentation is scheduled, until 7:30 AM.

Specific details on presentation sections, time duration, location, evaluation rubrics, etc. are available via Canvas. Late submissions or absence of any of the team members will not be accepted unless it's consistent with the policy of excused absences.

IMPORTANT FOR ALL ASSIGNMENTS AND DELIVERABLES:

- Students must confirm that file submissions via Canvas involve the right files. If you accidentally submitted a file that does not correspond to the ongoing assignment, please email the course instructor **within the next 24 hours**. If you unknowingly submitted the wrong file(s) and the course instructor notices it one day later or more, a zero score will be assigned to the relevant assignment.
- PLs, PAs, MEMs, FRs, and presentation must be prepared using appropriate formatting elements for plots, tables, figures, diagrams, etc., as well as elements of professional writing. Some of these assignments will be graded both on technical and formatting content including (but not restricted to) communication effectiveness either written or verbal, whenever it applies.

- **PARTICIPATION:** students will be evaluated *individually* for participation. Participation grade is a double contribution of aspects A and B described below.
 - A. **Active participation in experiments.** This will be evaluated by peer tutors and instructor via “*student evaluations forms*” based on punctuality, knowledge of theory, safety, experimental protocols, answers to questions, respect for others, and troubleshooting ability.
 - The score will be posted by the course instructor via Canvas.
 - B. **Completion of peer tutor evaluations and team evaluations (via CATME; www.catme.org).** Each student will complete these evaluations at the end of selected rotations. Specific deadlines will be announced and programmed in Canvas. CATME Team Evaluations can impact on your grade*
 - *Peer Tutor Evaluations: due Friday of Week 2 of every rotation, for all sections via Canvas.*
 - *Team Evaluations: due Sunday of the week a MEM or FR was submitted, for all sections via CATME (www.catme.org)*

*CATME gives out an individual “adjustment factor” depending on individual contributions to team-based homework. This factor might be applied to the grade obtained by your team. For example, if you team earns 90% (out of 100%) in a final report, but your individual adjustment factor is 0.95, you could earn 85.5% (0.95 x 90%). Note that it's also possible to earn an individual adjustment factor slightly greater than 1 if your contributions significantly surpassed those of your teammates.

Participation less than 50% anytime during the semester will result in a failing course grade. You are responsible for monitoring your participation percentage so that it remains equal or higher than 50% at any given time during the semester.

Grading Policy

Table 5. 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

- Students must know and follow safe operating procedures of devices and materials used in experiments as well as proper handling of hazardous materials.
- Students must attend a mandatory orientation & safety (O&S) session which includes a tour of the Unit Operations Lab at the beginning of the semester.
- Students must complete an assessment of the topics covered in the O&S session and lab tours as well as other contents of the class syllabus.
- **Failure to follow safety guidelines will result in significant grade reductions.** Examples of safety violations are listed below (this list is not exhaustive).

Table 5. 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 handling/cleaning a chemical spill properly, or not disposing of hazardous waste properly	Letter grade reduction
Causing a major spill due to negligence	Letter grade reduction
Exposing food or drink inside the lab*	Letter grade reduction
Using non-intrinsically safe/non-explosion proof electronic devices in areas restricting the use of electronics	Letter grade reduction

- *Food and drinks can be kept in fully closed containers or bottles in the lab, but they must remain inside backpacks.

- If a student needs to eat a snack or drink liquid, they will inform peer tutors or course instructor and will do it outside the lab. Upon reentry to the lab, all food and drink containers/bottles must be stored inside backpacks.
- Disposing of any kind of food/drink wrapping or containers inside the lab is NOT allowed. You must dispose of it in a regular trash can outside the lab. You can ask peer tutors or course instructors for the nearest regular trash bin located outside the lab.

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.

- Recording videos or taking pictures in the main areas of the Unit Operations Lab (rooms 100, 200, 300) is possible. **An intrinsically safety camera must be used**, but it must be approved by the course 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 Honor

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. 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 varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@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>

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.

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.

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.

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.

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](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://elearning.ufl.edu/>.

Career Connections 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: <https://distance.ufl.edu/getting-help/>; <https://distance.ufl.edu/state-authorization-status/#student-complaint>.