Process Design

ECH 4644, Class #19013 & #19022, Sections PD01 & PD02
Class Periods: (PD01) T Period 7-8, R Period 7; (PD02) MWF Period 7
Location: Weil 234
Academic Term: Spring 2025

Instructor: VJ Tocco

I prefer that you call me "VJ", but you may also call me "Dr. Tocco" if you are more comfortable addressing your instructors formally.
Email Address: **vjtocco@ufl.edu**
Office: **322 Black Hall, (352) 294-1290**
Office Hours: TBD, but tentatively Mondays from 4-5 PM and Thursdays from 3-4 PM. Please check Canvas for permanent office hour times.

Teaching Assistant/Peer Mentor/Supervised Teaching Student: None

Course Description

Preliminary design of convention chemical processes including process specifications, sitting and layout, equipment sizing, utility and manpower needs, safety and hazard analysis, environmental considerations and economic evaluation. Planning techniques for detailed engineering, construction and startup.

Course Pre-Requisites / Co-Requisites

Prerequisites: ECH 4403 and ECH 4504 and ECH 4604 and ECH 4824.

Course Objectives

- Apply Chemical Engineering concepts from previous courses (for example, material and energy balances, heat transfer, separation principles…) to design a chemical process.
- Develop "engineering judgment" to act as a guide for navigating uncertain situations.
- Use systematic methodologies and common heuristics for designing process units that meet stated performance specifications.
- Collaborate and communicate effectively within teams.
- Communicate technical information effectively in reports and presentations.
- Identify ethical issues associated with Chemical Engineering projects and make informed decisions.
- Use process simulation software effectively.

Materials and Supply Fees: None

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	High
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	Medium
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	Medium
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	High

Required Textbooks and Software
Analysis, Synthesis, and Design of Chemical Processes
By Turton, Shaewitz, Bhattacharya, and Whiting, 5th Edition
ISBN: 978-0134177403

Aspen HYSYS and/or Aspen Plus are required software, which are available to UF Chemical Engineering students free of charge. Instructions for downloading/using will be provided.

Recommended Materials: None

Required Computer
UF student computing requirement: *https://news.it.ufl.edu/education/student-computing-requirements-for-uf/*

Minimum System Requirements:
Operating System: Windows 10 or 11 required.
Processor: Intel Core-i5 family.
Memory: 16GB RAM
Storage: SSD with 120GB of available space.
Monitor: Graphics hardware acceleration requires a DirectX10 graphics card and a 1280 x 1024 or higher resolution monitor.
Network: 100MB/Sec.

Recommended System Requirements:
Operating System: Windows 11.
Processor: Intel Core-i7 family.
Memory: 16GB RAM
Storage: SSD with 250GB of available space.
Monitor: Graphics hardware acceleration requires a DirectX10 graphics card and a 1280 x 1024 or higher resolution monitor.
Network: 100MB/Sec.

Course Schedule

Week 1: Team formation, project selection, establishing project scope, team identity, and team expectations.
Week 2: Overviewing the design process, surveying literature for reaction chemistries
Week 3: Evaluating options, screening/scoring matrices
Week 4: Preliminary reaction modeling
Week 5: Heuristics of process synthesis
Week 6: Separation alternatives and thermodynamic models
Week 7: Separation modeling
Week 8: Energy Integration
Week 9: **Midterm Presentations and Reports**
Week 10: Safety
Week 11: Equipment Sizing & Costing
Week 12: Economic Analysis
Week 13-14: **Final Presentations and Reports**

Important Dates

Week of March 10-14   Midterm Presentations & Reports
Week of April 17-23   Final Presentations & Reports

Attendance Policy, Class Expectations, and Make-Up Policy

Process Design, sometimes referred to as "Senior Design" or "Capstone Design" is among the final courses you'll take as an undergraduate studying Chemical Engineering. It is the culmination of everything you have learned so far. Working in teams of 5, you will be expected to recall and apply principles from previous courses (including material and energy balances, separations, process safety, reactor design, heat exchanger design…) in designing a process to produce a chemical of interest.

A general class day will consist of 10-20 minutes of announcements and instruction. The rest of the time should be used to discuss and coordinate efforts within your team. I will also meet with teams as needed during class time.

Once per week (see below), one member from each team will present a short progress presentation. Your attendance is *highly encouraged* for these presentations.

In Midterm and Final Presentation weeks, two teams per class period will present their project to the class. Your attendance and attention are *required* for these presentations.

Also near midterm reports, your team will be required to critically evaluate another team's midterm report. Some class time may be dedicated to inter-team discussion for this review, for which attendance will be required (and advance notice provided).

Excused absences for mandatory attendance days must be documented in advance, and assignment make-up/exemption will be granted on a case-by-case basis, commensurate with the absence.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:
https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Evaluation of Grades

Assignment	Percentage of Final Grade
Progress/Midterm Reports	0%
Progress/Midterm Presentations	0%
Final Report (Team)	40%
Final Presentation (Individual)	20%
Peer Review (Team)	10%
Individual Assessment (Individual)	30%
TOTAL	100%

Assignment Explanations:

(Note: Although the Canvas page should be used for all graded assignments, please submit reports and presentation slides to the TEAMS channel as well, to facilitate file storage history and feedback)

Progress/Midterm Reports: Each week, your team will submit a written "progress report", containing an executive summary and your work on the project over the past week (a list of suggested criteria will also be given). Feedback will be provided for each progress report but will not count towards the final grade. Other teams will review and provide feedback on your midterm reports.

My recommendation/vision is that the progress reports are a "living document". Each week you are revising as needed and adding progress such that minimal editing is needed by the end of the semester to submit your final report.

Final Report: A comprehensive, written explanation of your team's process, due Wednesday, April 23. A list of suggested sections and grading criteria will be posted to Canvas.

Progress/Midterm Presentations: Each week, **one** member of your team (your choice) will provide a 7-minute semi-formal project update to the class (accompanying your progress reports). During midterm presentation week, your entire team will deliver a longer (~20 minute), more formal project presentation. Each member of the team must have a substantial speaking role in midterm presentations. Similar to the report structure, progress/midterm presentations are for feedback and improvement, while only the final presentation will count towards the final grade.

Final Presentation: At the end of the semester, your team will deliver a ~20 minute oral presentation describing your process. Individual performance in this presentation will be assessed and counted towards the final grade.

Peer Reviews: Your team will critically evaluate another team's midterm presentation and midterm report, and disseminate your review in a memo to the other team. Your peer reviews will be graded on the criteria of professionalism and depth of feedback provided.

Individual Assessment: Your individual contributions within your team and performance throughout the semester will be evaluated by the instructor at the end of the term. A detailed rubric will be posted to Canvas. Students will submit an individual letter of self-assessment in these areas.

Responsible/Ethical Use of AI Policy:

Your team is permitted (and encouraged) to use AI for the sole purpose of improving the clarity, organization, and structure of your writing. However, you should NOT use AI to make design decisions, or in any situation where "engineering judgment" is required. You should not cite AI as a source of data or information. An "AI use disclosure statement" will be required for all assignments, in which your team will document and disseminate contributions of AI in your work.

Grading Policy

All assignments will have corresponding rubrics posted on Canvas

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

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The 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 Undergraduate 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

Campus Resources:

Health and Wellness

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: https://counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

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*.