Process Design

ECH4644 Section DES8, Class #20135
Class Periods: MWF Period 7 (1:55 PM – 2:45 PM)
Location: CSE E220
Academic Term: Fall 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, tentatively Mondays from 12:00 PM – 1:00 PM and Thursdays 2-3 PM.

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	Medium

informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
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

Please see the most updated HWCOE student computer requirements and recommendations at this link: *https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/*

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: **Midterm Presentations and Reports**
Week 9: Energy Integration
Week 10: Safety
Week 11: Equipment Sizing & Costing
Week 12: Economic Analysis
Week 13-14: **Final Presentations and Reports**

Important Dates

Week of Oct. 13-17 *Midterm Presentations & Reports (Presentations MWF during Class)*
Week of Nov. 17-21 *Final Presentations & Reports (Presentations MWF during Class)*

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 presentations to the TEAMS page as well, to facilitate file storage history and feedback)

Progress/Midterm Reports: Each week, your team will submit a "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 will be similar in format to the final report, and each week you are simply adding to/editing.

Final Report: A comprehensive, written explanation of your team's process, due Friday, November 21. 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 have the option to submit an individual letter of self-assessment in these areas.

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

Academic Policies & Resources
To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive 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.

If you feel like your performance in class is being impacted, 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