

Process Design

ECH 4644, Class #23965 & #23966, Sections PD01 & PD02

Class Periods: (PD01) T Period 7-8, R Period 7; (PD02) MWF Period 7

Location: (PD01) Weil 0273; (PD02) Weil 0238

Academic Term: Spring 2024

Instructor:

VJ Tocco

vjtocco@ufl.edu (preferred mode of contact)

Office Hours (In-Person OR Zoom): Mondays and Tuesdays 12:45-1:45 PM

Office: Black Hall 322

Office phone: (352) 294-1290

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Manan Rathod

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Office Hours: **TBD**

Course Description

Preliminary design of convention chemical processes including process specifications, siting 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

- To instill an ability to analyze comprehensive situations and masses of data and facts in order to define key problems and variables.
- Learn systematic methodologies for designing components, units and processes that meet performance specifications.
- Learn how to search the literature for possible solutions to various aspects of the problems.
- Develop techniques for checking individual work for accuracy and learn to work together as part of a team to review and help each other avoid mistakes.
- Become power users of available computer aided engineering tools.

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

A laptop computer able to run Windows is required. HYSYS and ASPEN Plus are required software, which are available to UF Chemical Engineering students free of charge. (Instructions for downloading/using will be provided)

Course Schedule (tentative)

Jan 8-12: Team formation, project selection, establishing project scope, team identity, and team expectations.

Memo 1 due 1/16

Jan 15-19: Overviewing the design process, surveying literature for reaction chemistries

Memo 2 due 1/23

Jan 22-26: Evaluating options, screening/scoring matrices

Memo 3 due 1/30

Jan 29-Feb 2: Preliminary reaction modeling

Memo 4 due 2/6

Feb 5-14: Heuristics of process synthesis

Memo 5 due 2/13

Feb 15-21: MIDTERM PRESENTATIONS AND REPORTS 1

Feb 22 – Mar 1: Separation alternatives and thermodynamic models

Memo 6 due 2/27

Mar 4-Mar 8: Separation modeling

Memo 7 due 3/5

Mar 11-15: Spring Break

Mar 18-22: Energy Integration

Memo 8 due 3/19

Mar 25-27: Safety

Memo 9 due 3/26

March 28-April 3: MIDTERM PRESENTATIONS AND REPORTS 2

Apr 4-12: Equipment sizing, costing, and economic analysis

Memo 10 due 4/9

Memo 11 due 4/16

April 18-24: FINAL PRESENTATIONS AND 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 in designing a process to produce a chemical of interest.

Class time will be split into one of four activities (with appropriate notice to be given on Canvas):

- 1) Lecture/instruction – Course content delivery
- 2) Intra-team working sessions – Work within your team to coordinate effort/achieve the next deliverable
- 3) Inter-team review sessions – Work in between teams to critically evaluate and offer feedback on the work of others
- 4) Presentations – Teams present to other teams in the audience

Your attendance and attention are required for **inter-team review sessions** and **presentations**. Excused absences 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	Total Points	Percentage of Final Grade
Memos (Team)	15 each	15%
Individual Assignments/Critical reviews (Individual)	Varies	15%
Reports (Team) — 2 midterm, 1 final	100	30%
Presentations (Individual) — 2 midterm, 1 final	100	30%
		100%

Memos: Approximately weekly (see above), your team will prepare a short (3-4 page, excluding appendices) memo that describes your progress toward your project. Each memo will have a list of required/suggested sections to address.

Individual Assignments: Individual homework assignments/quizzes may be administered occasionally to assess ability in the design process or simulation software.

Critical Reviews: Seeking and providing feedback is an essential part of engineering. You will be asked to review and evaluate the memos/reports/presentations of other teams, then provide verbal or written feedback. Your reviews will be scored based on the quality and professionalism of your constructive criticism.

Reports (2 midterm, 1 final): Written explanations of your team's process in detail. Each report will have a suggested structure and unique requirements.

Presentations (2 midterm, 1 final): Each report will have a corresponding presentation to be given during class time to an audience of the other teams. Each member of the team must have a substantial speaking role, and oral communication abilities will be evaluated.

Grading Policy

All assignments will have corresponding rubrics posted on Canvas.

Assignments listed as "individual" will be completed individually and will be evaluated based on individual work on a straight scale.

Assignments listed as "team" in the table above will have one grade for the team, but individual scores may be adjusted based on individual efforts/contributions to the team. Generally, team assignments will be evaluated on a curve, relative to the other teams.

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/studentsj>. 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/uflj>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-resultsj>.

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 Graduate Program Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@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

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://lss.at.ufl.edu/help.shtml>.

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>.