Process Design
ECH 4644, Class #25585, Section PD02
Class Periods: MWF, Period 7 (1:55 PM – 2:45 PM)
Location: WEIL 0234
Academic Term: Spring 2023

Instructor:
VJ Tocco
vjtocco@ufl.edu (preferred mode of contact)
Zoom Office Hours: Tuesday 12:30 – 1:30 PM, Thursday 11 AM – Noon
Office: Black Hall 322

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
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Office Hours: TBD

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
- 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

Product & Process Design Principles – Synthesis, Analysis and Evaluation.
By Seider, Seader, and Lewin, **any edition** (1st edition is great, and available on Amazon)
ISBN: 978-0471243120

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

Course Schedule

- Overview of the design process (week 1)
    - Assessing the problem
    - Surveying literature
    - Database creation & property estimation
    - Safety & environmental impact
    - Preliminary process synthesis
- Concept screening & scoring matrices (week 2)
- Steady state simulation of reactors using HYSYS (week 3)
- Heuristics for process synthesis (week 4)
- Synthesis of separation trains (week 5)
- Steady state simulation of separation processes using HYSYS (weeks 6-7)
- Separation of azeotropes (week 8)
- HYSYS simulation of separation of azeotropes (week 9)
- Heat and power integration (week 10)
- Steady state simulation of entire plants (including integration) using HYSYS (weeks 11-12)
- Economic evaluation of designs (weeks 13-14)

Attendance Policy, Class Expectations, and Make-Up Policy

Each team is required to participate in a weekly 20-minute workshop which will include a short presentation about the weekly deliverable. Each team member is required to attend, unless their absence is excused, and the presenter of the team must rotate each week. These workshops are tentatively scheduled on Tuesdays between 4 PM and 5:30 PM (location TBD).

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

Homework*	20 % (individual)
HYSYS exam**	20 % (individual)
Workshop & class participation***	5 % (individual)
Final oral presentation	5 % (individual)
Project progress reports (approximately one per week)	25 %****
Final design report	25 %****

*   Homework assignments are individual, and involve process simulations using Aspen HYSYS software.

**   The HYSYS exam is the class final exam and will be held via Zoom/Honor Lock in the evening of Tuesday, April 18

***   Workshop & class participation grade:
88 if the student has no unexcused absences but does not participate. This number is decreased in proportion to unexcused absences and raised according to how frequently a student answers or asks questions.

**** There will be 11 or 12 progress reports, each one associated with a weekly deliverable. The average of these and the final report will receive a team grade, but for each student this will be modified by the formula below:
Individual grade = team grade * 0.5 {min[1 + (average of student's peer evaluation on a 1-5 scale excluding max and min)/(team average)], 2.2}. Extreme outliers will be ignored.
This essentially gives each student the average between the team grade and the team grade multiplied by the ratio of the student's peer rating divided over the average of all the team's members peer rating. The averages exclude the highest and lowest scores.

Once a numerical overall grade has been determined as explained above, the students are sorted in the order of decreasing overall points. Grades are then decided as follows:

Division between A and A- : Largest gap between two students with 90 >= overall points > 85
Division between A- and B+ : Largest gap between two students with 85 >= overall points > 80
Division between B+ and B : Largest gap between two students with 80 >= overall points > 75
Division between B and B- : Largest gap between two students with 70 >= overall points > 65
Division between B- and C+ : Largest gap between two students with 65 >= overall points > 60
Division between C+ and C : Largest gap between two students with 60 >= overall points > 55
Division between C and C- : overall points > = 50 (no gap here, 50 is C, 49.9 C-)
Division between C- and D+ : Largest gap between two students with 40 >= overall points > 35
Division between D+ and D : Largest gap between two students with 30 >= overall points > 25
Division between D and D- : Largest gap between two students with 5 >= overall points >= 0

E: Pursued for students with honesty violations

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 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
• Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@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/.

E-learning technical suppor*t*, 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/state-authorization-status/#student-complaint.*